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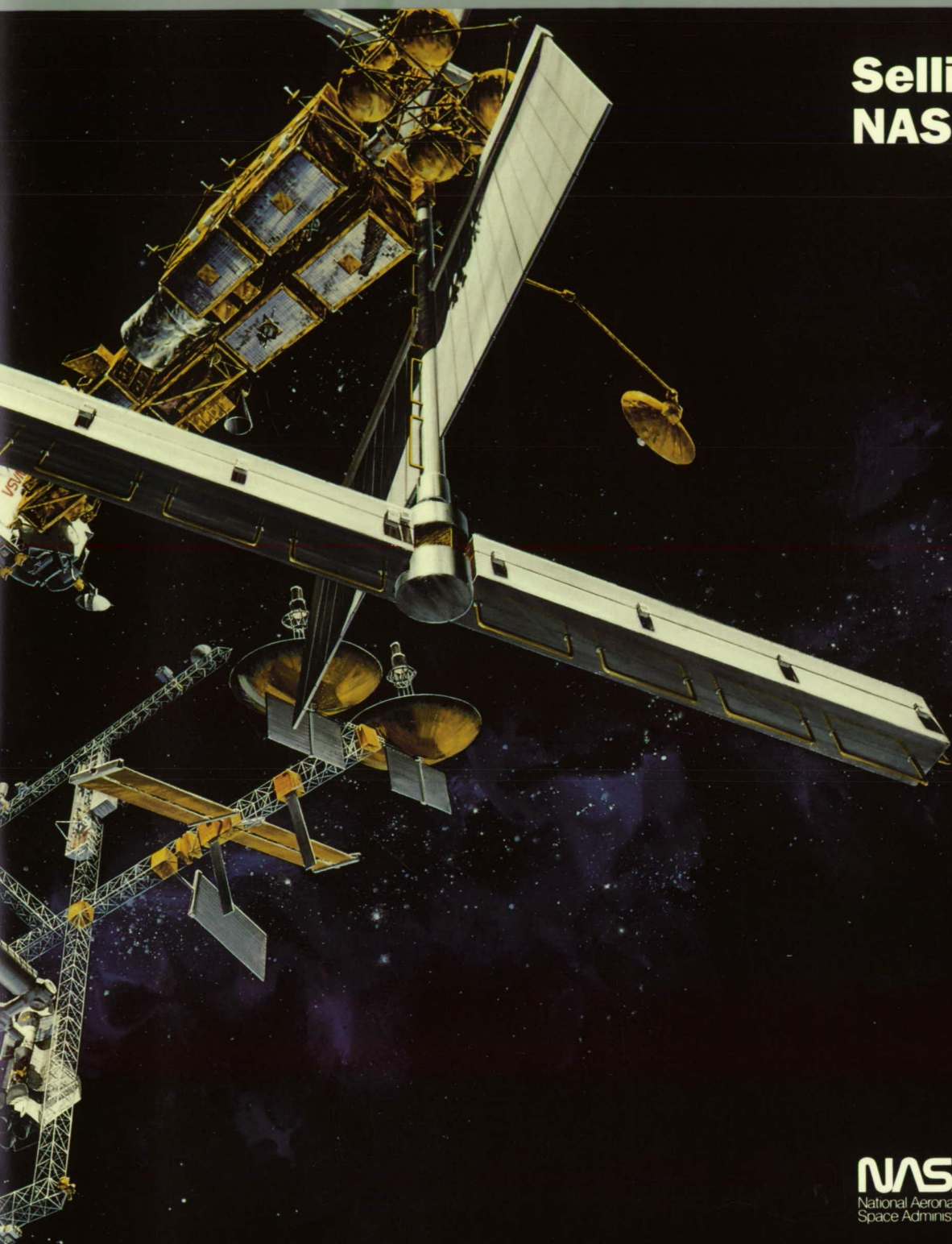
NASA
National Aeronautics and
Space Administration

N91-18895

(NASA) 58 P
CSCL 05A

(NASA-NP-123) SELLING TO NASA

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Published by:

NASA

Office of Small and Disadvantaged
Business Utilization
Washington, DC 20546

For Sale by the
Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

Cover:

Artist's concept of a permanently-inhabited civil space station which the U.S. has named "Freedom". This complex through the cooperation of the U.S., Canada, Japan, and the European Space Agency is to be placed into a 300 mile high equatorial orbit by NASA in the mid 1990s.

The National Aero-Space Plane (NASP) Program, is a research program designed to build and flight test a research vehicle (the X-30) which will fly 12 to 25 times the speed of sound, leading to an entirely new family of aero-space vehicles. Conceptually, the future aero-space planes would take-off and land on conventional runways operating as an airplane at hypersonic velocities in the upper atmosphere, or as a space launch vehicle capable of accelerating directly into orbit.

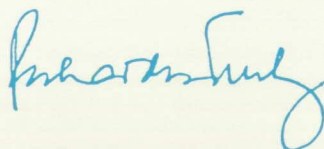
F O R E W A R D

Message to new and prospective NASA contractors

This handbook is designed to promote a better understanding of NASA's interests and the process of doing business with NASA. We seek your products and services—whether they are an abstract idea, a manufacturing capability, a fabricated component, construction, basic materials, or a specialized service. NASA purchases all of these, and more.

Your expertise, potential, and willingness to participate in the advancement of aeronautical and space science and technology (through research, manufacturing efforts, or support services/products) are essential for accomplishing NASA's missions. I hope you will agree when you read this brochure and discover all the opportunities it offers, that NASA is open to your proposals.

We welcome your personal or written inquiry and trust that your marketing endeavors with NASA will be a mutually profitable and fruitful experience.

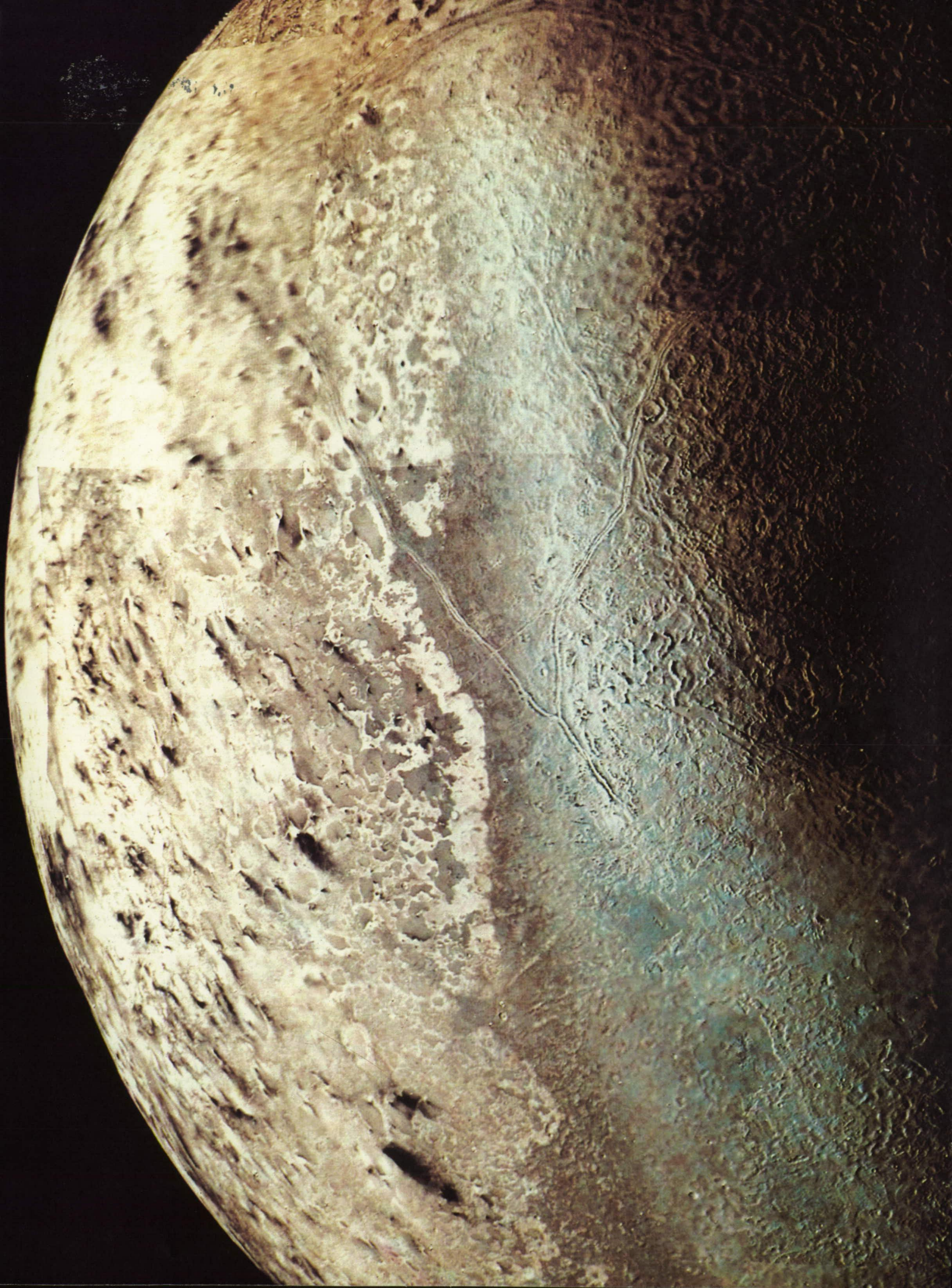


Richard H. Truly
NASA Administrator

America's Space Shuttle provides a link to the new economic frontier of space, enabling NASA and U.S. industry to conduct research in this unique environment.



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Voyager 2's final planetary encounter took place on August 25, 1989, when the spacecraft sailed within 3,000 miles of the cloud tops of Neptune's north pole. Five hours later, Voyager 2 swept past Triton, a cold, bright moon where volcanoes may spew ice particles into the thin nitrogen atmosphere. Now Voyager 2 is heading out of the solar system, diving below the eclectic plane to search for the beginning of interstellar space.

T*he National Aeronautics and Space Administration (NASA) was established by the National Aeronautics and Space Act of 1958 to plan, direct, and conduct aeronautical and space activities for peaceful purposes for the benefit of all mankind. NASA's goals in space are to develop technology to make operations more effective, to enlarge the range of practical applications of space technology and data, and to investigate the Earth and its immediate surroundings, the natural bodies in our solar system, and the origins and physical processes of the universe. In aeronautics, NASA seeks to improve aerodynamics, structures, engines, and overall performance of aircraft, to make them more efficient, more compatible with the environment, and safer. This chapter is intended to acquaint prospective contractors with the organizational structure of NASA, and to briefly describe the major technical program offices and selected staff offices at the Headquarters level.*

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NASA Headquarters Offices are located near the U.S. Capitol in Washington, D.C.

NASA's mission is planned, directed, and coordinated from its Headquarters in Washington, DC, the focal point for policy and program formulation. The operational aspects of NASA's work in aeronautics and space are performed through its spaceflight centers, research centers and other installations at various locations throughout the country. Each installation has a specifically prescribed mission, with related tasks, and is allocated the resources necessary for their accomplishment. Though these NASA installations have unique "in-house" capabilities, their research and operations

are pursued mainly through private industry, with the additional support of universities and other nonprofit research organizations. The installations and their major technical programs are described in Chapter 5.

The overall management and allocation of resources for NASA technical programs is accomplished through five Headquarters program offices. The primary research and development activities of these offices, which assign mission responsibilities to NASA field installations as appropriate, are as follows.

Program Offices *Research and Development Activities*

The Office of Aeronautics and Space Technology (OAST) is responsible for the conduct of programs to develop advanced technology to enable and enhance the aggressive pursuit of national objectives in aeronautics, space, and transatmospherics, including the National Aero-Space Plane program; to demonstrate the feasibility of this advanced technology in ground, flight, and in-space facilities to ensure its early utilization; and to ensure the application of NASA capabilities and facilities to programs of other agencies

and the U.S. aerospace industry. In addition, the Office is responsible for managing the Ames, Langley, and Lewis Research Centers.

In aeronautics, OAST is responsible for the conduct of advanced research and technology programs which enable and enhance National objectives of enduring leadership in civil and military aviation; investigation of the feasibility of selected advanced technology at the component and systems level to establish benefits and practical utility of advances; support of the military in development and validation of technologies to achieve superior military systems; conduct of complementary research related to air transportation system safety and productivity in support of the Federal Aviation Administration; and application of unique NASA capabilities and facilities with programs of other government agencies.

OAST's aeronautics program is the nation's primary source of innovative, long-term aeronautical and transatmospheric research and technology development. Research in aerodynamics, propulsion, materials and structures, information sciences, guidance and controls, human factors and flight systems provides a continuous flow of advanced technology and innovative concepts from which the U.S. aviation industry draws in developing safer, more efficient, and more effective generations of civil and military aircraft. Major thrusts include:

- Pioneering the development and validation of the fundamental knowledge base and numerical simulation techniques for analyzing and predicting external and internal flows, structural mechanics, control theoretics, and their interactions in order to enable practical application to aircraft, engine and aviation system design and operation.

- Resolving the critical environmental issues about atmospheric impact, airport noise, and sonic boom and establishing the technology foundation for viable supersonic cruise aircraft which could travel at speeds more than twice that of sound, have transpacific range, and operate at overall economies approaching subsonic aircraft.

- Development and flight validation of the critical technologies for future hypersonic and transatmospheric vehicles which will be capable of taking-off and landing from conventional runways and sustaining hypersonic flight in the atmosphere or accelerating into space.

- Technology for an entirely new generation of fuel efficient, superior U.S. aircraft which will improve the safety and efficiency of the National Airspace System and help alleviate noise and other environmental concerns, including drag reduction, high-lift systems, advanced composite materials, hazardous weather detection, human-centered automation, and advanced controls and propulsion.

- Technology for advanced rotorcraft with the combined capability of vertical takeoff and high forward speed which will improve intercity and interregion transportation, reduce U.S. airport congestion without requiring major investments in new runway construction, and enhance military capability.

- High performance military aircraft technology to enable effective low-speed control at high angles-of-attack, supersonic short takeoff and vertical landing, and propulsive control for enhanced maneuverability.

- Advanced high temperature materials such as ceramics, ceramic composites, carbon-carbon, and metal-matrix composites for use in lightweight airframes and high performance, uncooled turbine engines.

- Enhancement of the capabilities of NASA's Aeronautical Research Facilities by improving the productivity and integrity of these unique national assets and by extending capabilities in critical technology areas.

OAST space research and technology programs provide the advanced technology essential for the design, development, and operation of future space systems and missions, including those for transportation, spacecraft, platforms, stations, outposts and bases. The technology also is intended to serve the long-term needs of other civil, commercial, and national security uses of space. The space research technology program is composed of two complementary parts: the research and technology (R&T) base program and focused technology programs.

The R&T base program is concentrated in ten discipline elements: aerothermodynamics, space energy conversion, propulsion, materials and structures, space data and communications, information sciences, controls and guidance, human factors, space flight, and systems analysis. The R&T base program is a fundamental effort that provides research in emerging technologies and feasibility analyses, including proof-of-concept verification.

In the focused programs, technologies are developed for specific applications. Products are delivered in the form of demonstrated hardware, software, and design techniques and methods. Two such programs are underway at NASA: the Civil Space Technology Initiative (CSTI) and Pathfinder.

In CSTI the objective is to advance the state of technology in key areas where capabilities have eroded over the last decade. The program includes research in technologies to enable efficient, reliable

access to and operations in Earth orbit, and to support science missions. The program's technology thrusts are divided into three categories: Space Transportation, Space Science and Space Operations.

The Pathfinder program implements the new national space policy directing that, for the first time, the Nation expand human presence and activities beyond Earth's orbit into the solar system. It is aimed at developing the critical technologies that will be required to enable piloted or robotic exploration missions. The focus is on four major technology areas to enable solar system exploration missions, including: surface exploration, in-space operations, humans in space, and space transfer vehicles.

Supporting NASA's capability to move forward in focused programs are the nine universities currently participating in the University Space Engineering Research Center Program. The universities have been given broad charters for independent research to conceive technology alternatives that will broaden the options available to the Agency in selecting and defining future missions. In pursuing technology alternatives, universities are encouraged to develop collaborative relationships with NASA Centers and industry.

Planning efforts have been increased in two new areas. The first is aimed at expanding the in-space technology experiments program to validate and verify key technologies in the actual space environment and take full advantage of the opportunities that will be provided with the deployment of the Space Station Freedom. The second area of emphasis will increase research and technology activity to provide enabling capabilities for future programs associated with monitoring the Earth's global change.

The Office of Space Flight (OSF) is responsible for planning and carrying out the U.S. civil space transportation program. This includes operating and advancing all elements of the National Space Transportation System (NSTS) or Space Shuttle, managing U.S. civil government use of this nation's commercially available expendable launch vehicles (ELVs), and undertaking supporting programs related to current and future space transportation requirements.

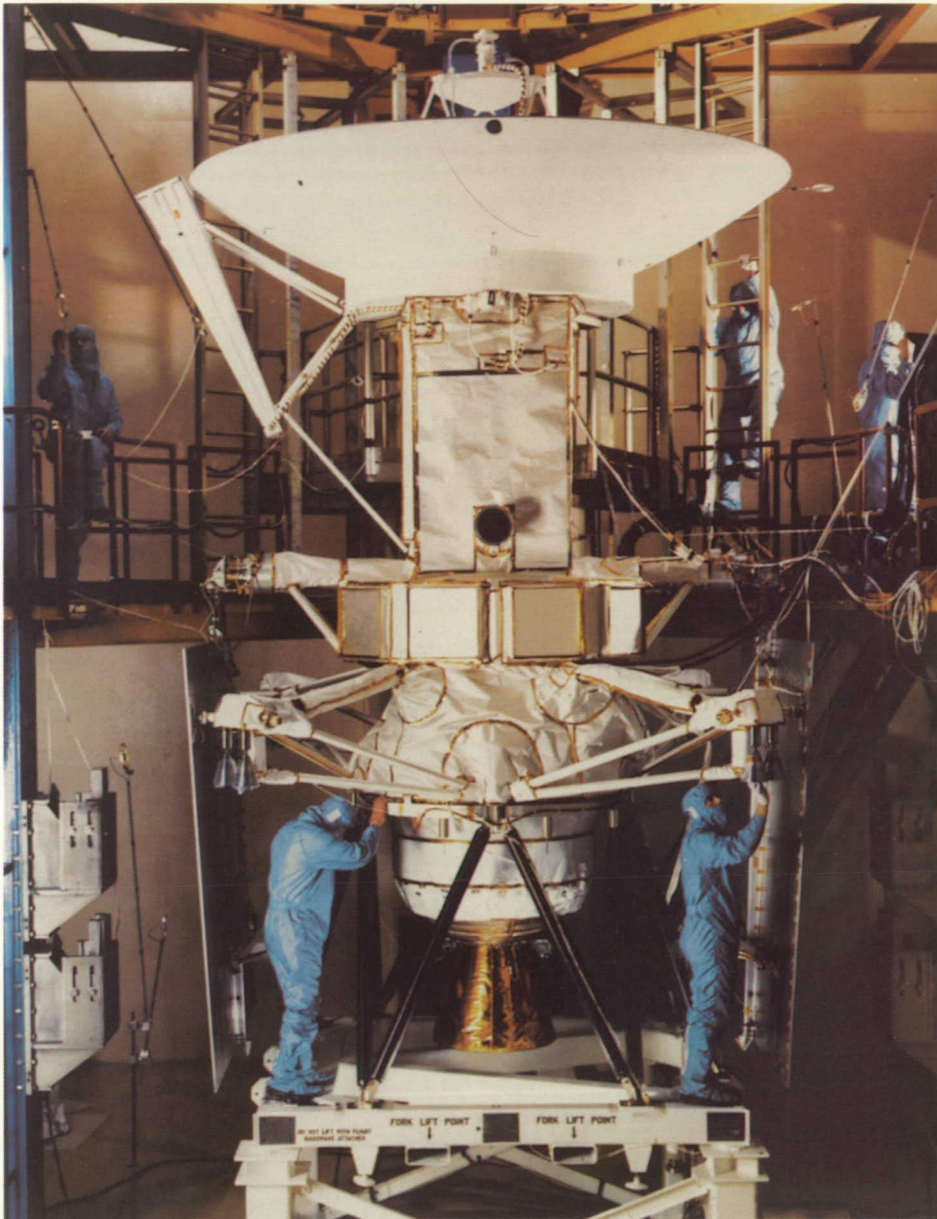
OSF employs the unique capabilities of both unmanned ELVs and the manned Space Shuttle, which comprise the mixed fleet, to provide safe, reliable transportation to, in, and from space. Space transportation is an essential underpinning of NASA's overall program, enabling on-orbit operations, space science and the exploration of the solar system. In particular, the multi-purpose Space Shuttle not only serves as a proven means of space transportation for men and

NASA engineer inspects a scale model of the F-16 XL aircraft before testing in a wind tunnel at Langley Research Center.



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The Magellan spacecraft will conduct a comprehensive observation of the surface and gravitational features of Venus. The Spacecraft, as shown above, is being prepared for testing.

women and key scientific, technological and national security payloads, but it can also accomplish many jobs in orbit that currently cannot be done any other way, such as manned, interactive research in space with its Spacelab and the retrieval and repair of satellites.

OSF programs may be broadly divided into three major areas:

■ Development of space transportation capabilities — primarily the acquisition, testing, production and continuing improvement of the national fleet of Space Shuttle orbiters, external tanks, solid

rocket boosters, Spacelab, upper stages and supporting ground systems. This area also includes the development and testing of two flight projects—the Orbital Maneuvering Vehicle (OMV) and the Tethered Satellite System (TSS).

■ Space flight operations — Space Shuttle pre-launch, launch, flight, landing, and postlanding activities and similar operations for expendable launch vehicles.

■ Advanced programs — the planning, selected definition and preliminary design, and key advanced development of technologies and techniques for evolutionary and next generation space transportation systems and supporting elements. Activity in this area is focused on advanced transportation technologies and vehicle concepts, satellite servicing, and advanced operations support.

The OSF has institutional management responsibility for Johnson Space Center, Kennedy Space Center, Marshall Space Flight Center, and Stennis Space Center.

The Office of Space Science and Applications (OSSA) is responsible for all research and development activities which utilize space systems,, supported by airborne and ground-based observations, to conduct scientific investigations of the earth and its space environment, and for the identification, development and demonstration of space-related systems technology and other capabilities which can be used for practical benefits to mankind. The elements of OSSA programs can be divided into two groups—those whose goal is primarily scientific understanding and those whose goal is primarily to improve the usefulness of space for nearer-term purposes. The first group includes efforts to observe the distant universe, explore the near universe, understand Earth's space environment, and characterize Earth as a planet. The second group consists of programs in life sciences, satellite communications and studies of materials under microgravity conditions.

Observation of the distant universe involves measurements of all forms of radiation and particles reaching Earth from beyond the solar system, and includes study of the sun. The subjects under study deal with the origin, evolution, and structure of the universe, and with the fundamental laws of physics that govern the behavior of matter in the large scale.

Exploration of the near universe involves visits to and studies of the full range of objects and environments space flight has made directly accessible. The questions investigated deal with the origin and evolution of the solar system, and the comparison of Earth with other planets. Measurements have focused on the internal structure, surface features, atmospheres, and plasma environments of the planets and satellites.

Characterizing Earth and its environment has involved measurements of neutral and ionized particles and the electric and magnetic fields of Earth and its surroundings. The questions addressed focus on how the solid planet, land surfaces, oceans, atmosphere, and plasmasphere function and interact. The origin of life on Earth and how it has evolved and is maintained also are studied.

The Life Sciences program seeks to ensure the health, safety, well-being, and effective performance of humans in space, and to prepare the way for humankind to take a place in the larger environment of the solar system. It uses the space environment to advance knowledge in medicine and biology by conducting experiments on living organisms in space.

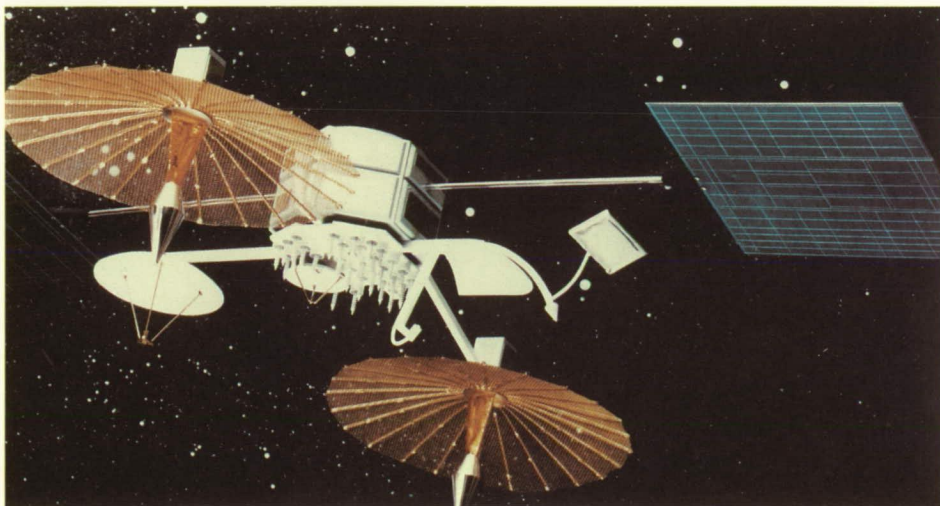
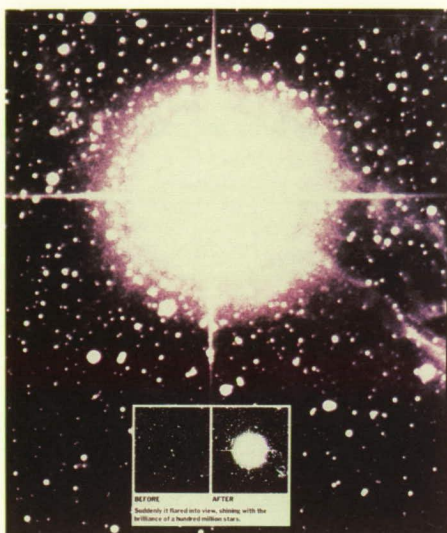
The Communications program seeks to develop high-risk, advanced multiple-frequency-band technology for space communications to support a wide range of future communications systems required by NASA, other government agencies, and U.S. industry.

The Materials Processing program consists of ground-based and space-based research to improve basic understanding

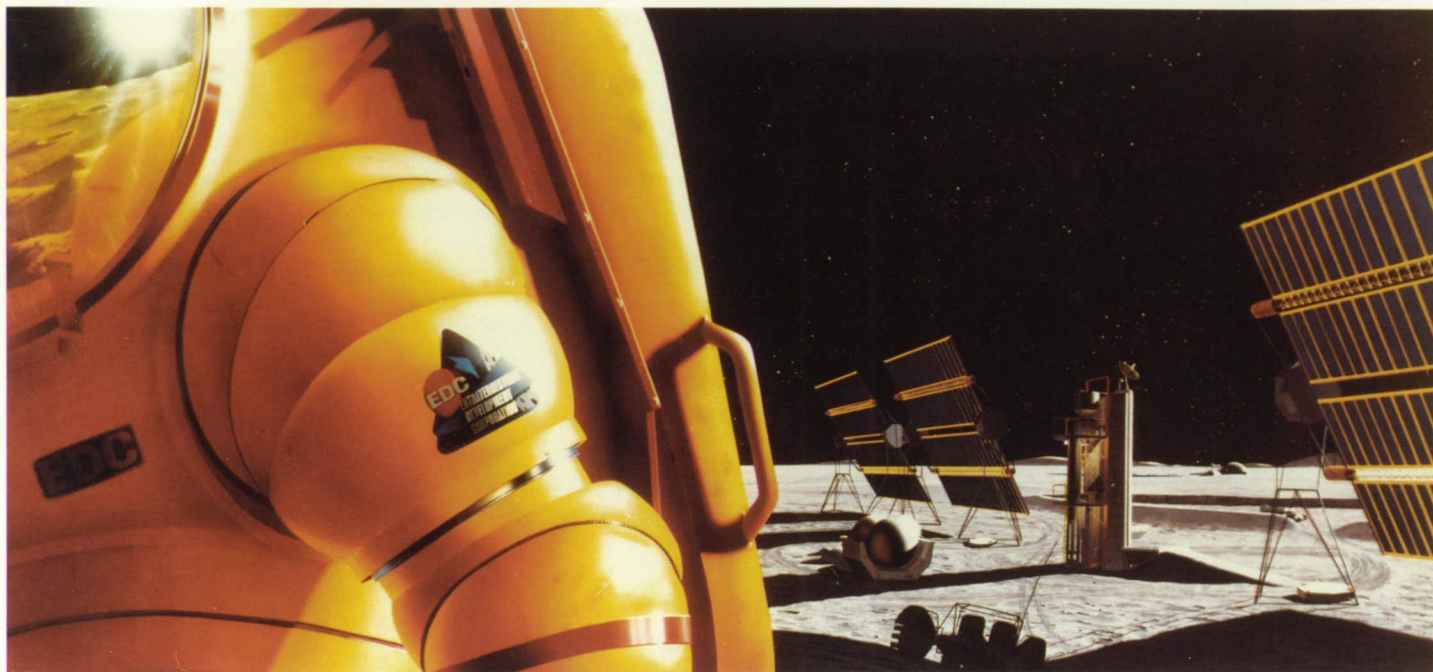
of materials and materials processes, and to explore processing that can be carried out to advantage in space. The knowledge it provides could lead some day to development of a new industry in space.

The Office of Space Science and Applications has institutional management responsibility for Goddard Space Flight Center and the Jet Propulsion Laboratory.

Directly below: Supernova 1987a—OSSA established a Supernova Program to coordinate NASA's SN 1987a-related activities
Far below: Tracking and data relay satellite.



The Office of Space Operations (OSO) is responsible for providing worldwide tracking, command, telemetry, data acquisition, and facilities required in support of NASA and other agency programs. Support is provided to Planetary Spacecraft, Earth Orbiting Satellites, Shuttle Missions, Sounding Rockets and Balloons, and Aeronautical Test Vehicles. The Office of Space Operations has a worldwide Space and Ground Network, one for deep space missions and one for earth-orbital missions, that provides this support. The Space Network is the most complex highly sophisticated tracking system in the world. It is comprised of the Tracking and Data Relay Satellite System (TDRSS) and supporting ground elements which include the Network Control Center (NCC), NASA Ground Terminal (NGT), Flight Dynamics Facility, and the Simulation Operations Center. The Ground Network provides Earth-based tracking and data acquisition support services to all NASA science and engineering missions for vehicles in high Earth orbit and in Deep Space; there are three separate networks: The Deep Space Network, the Spaceflight Tracking and Data Network; and the Aeronautics, Balloons, and Sounding Rocket Program. OSO provides a global communications system linking the tracking sites, with all the above facilities that provide real-time data processing for mission control, orbit and attitude



NASA's Office of Exploration is studying potential scenarios for human exploration of the solar system in the early part of the 21st Century.

determination, and routine processing of telemetry data for space missions.

Specific goals and objectives of the Office of Space Operations include:

- Improve the efficiency of handling and processing large volumes of data.
- Upgrade the communications support provided by NASCOM (the NASA network of leased communications services for operational data flow among stations, central facilities, and users) to meet the demands of NASA missions with higher data rates.
- Provide technology development to facilitate use of the TDRSS space network.
- Increase telemetry reception capabilities for Voyager's encounter with Neptune.

- Continue support to the aeronautics, sounding rocket, balloon, and geodynamics programs.
- Modernize mission-support computing.
- Provide a single, efficient network for program-support communications.
- Begin definition of a TDRSS follow-on system.

Office of Exploration: Among the goals of the current National Space Policy is the directive to "expand human presence and activity beyond Earth orbit into the solar system". While the policy does not articulate a specific location, timetable, or purpose, a study team led by NASA's Office of Exploration (OEXP) is moving forward to identify alternatives and recommendations for an early 1990s Presidential decision for a focused program of human exploration. Through a nationwide study effort involving the talents of personnel from NASA, universities, and private industry and

individuals, the office is working to fully understand the exploration options for missions to the Moon and Mars. The study seeks to avoid an over simplistic Moon versus Mars debate, and instead focuses on opportunities, rationale, and scale of future human

The immediate objectives of the Office are to:

- Update and refine exploration mission options for detailed study
- Obtain a more detailed understanding of prerequisite requirements in the areas of

Earth-to-Orbit Transportation
Life Sciences Research
Scientific Precursor Missions
Advanced Technology
Telecommunications, Data
Handling, and Navigation
Space Station Freedom Capabilities

- Continue building the capabilities of the OEXP study team
 - Develop effective internal and external communications
 - Conduct the first relative cost estimate.
- A high priority is placed on positioning the Nation to accomplish exploration objectives in the first decade of the 21st Century, while at the same time, not allowing the desire to drive required investments in the nearer term (through the 1990s) beyond levels that are considered reasonable and practical. The strategy is sensitive to the schedules of key prerequisite programs, such as Space Station Freedom, which have plans extending into the late 1990s, with associated demands for technical skills and resources. Therefore, the Office seeks to effectively build on current programs, keep the demand for exploration-unique resources at a modest level, and still preserve a capability to act in the first decade of the next century.

The Office of Space Station is responsible for directing NASA's efforts to develop the permanently manned Freedom space station, planned to begin operations in the mid 1990s. Space Station Freedom is an international space complex comprised of four spacecrafts: the permanently manned orbiting base which includes the U.S., the European Space Agency (ESA) and Japanese laboratory modules and a U.S. habitation module; NASA's polar-orbiting platform; ESA's Columbus polar platform and ESA's Columbus free-flyer.

The Space Station Freedom program will be managed from the Washington, D.C. area. The Office of Space Station in Washington, D.C., will provide the overall policy direction and management for the Freedom program.

NASA will retain the role as prime integrator of the Freedom program. The Space Station Freedom Program Office,

located in Reston, Virginia, a suburb of Washington, will be responsible for the overall technical direction and content of the project, including systems engineering and analysis, program planning and control, configuration management and the integration of all the elements into an operating system, including the elements provided by the international partners.

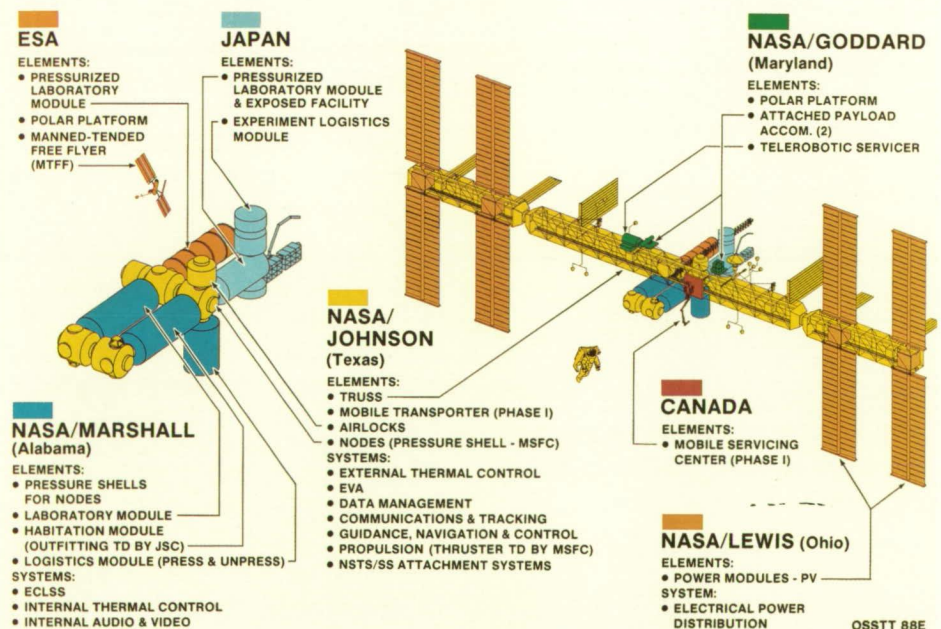
The NASA program office will be assisted by the Jet Propulsion Laboratory which will provide an independent program requirements and analysis function. The strong systems engineering integration capability provided by the Freedom Program Office will enable NASA to develop a space station that is responsive to the needs of the users, cost-effective to operate and maintain and flexible in terms of eventual growth in size and capabilities.

To utilize the expertise developed at NASA's field centers over the past three

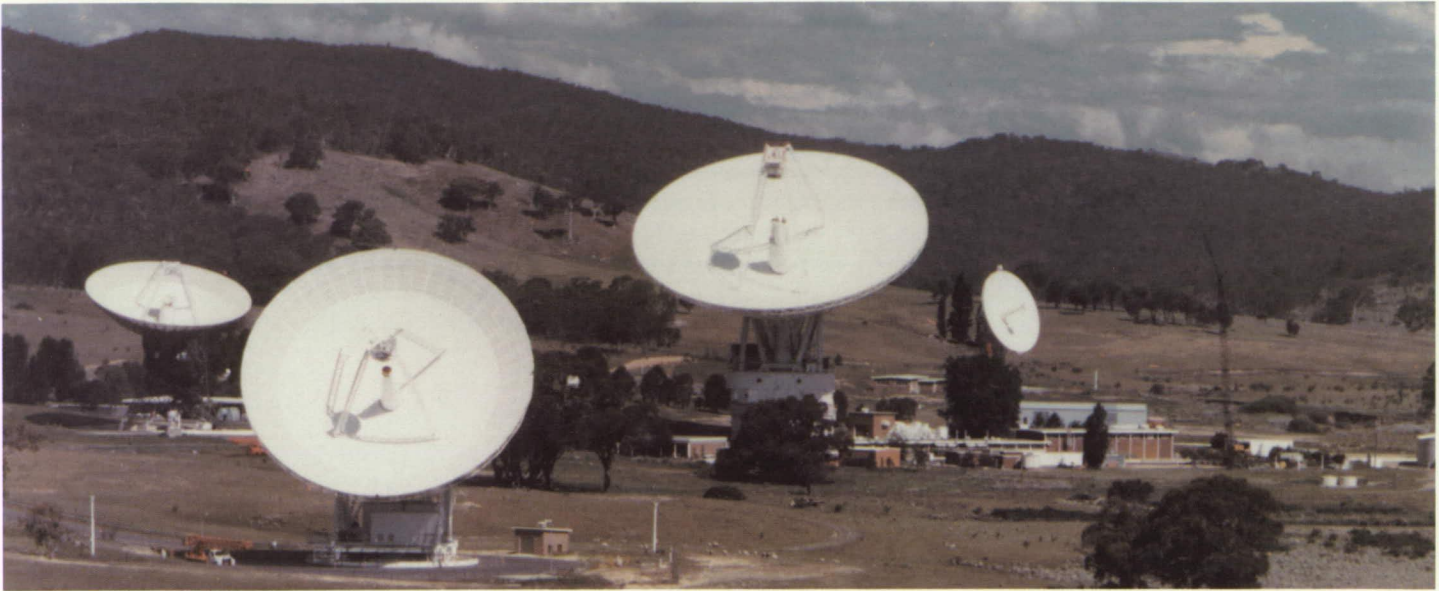
decades, the Freedom program is divided into four work packages. A NASA field center is responsible for the detailed design, development, test and evaluation of a specific set of components and systems within the work package. Furthermore, each NASA center has a team of aerospace contractors working under it. NASA awarded contracts for the design and development of the space station elements in December 1987.

- Work Package 1, under the management of the Marshall Space Flight Center (MSFC), involves building and outfitting the laboratory and habitat module and the pressure vessels of the four connecting resource nodes. MSFC is also responsible for building the logistics modules, the environmental control and life support system, internal thermal management system, internal audio and video systems.

This diagram of Space Station Freedom demonstrates the cooperative efforts of NASA, Canada, Japan, and nine European countries through the European Space Agency.



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Deep Space Network in Canberra, Australia

■ Work Package 2, under the management of the Johnson Space Center (JSC), involves developing the manned base's structural framework to which the various elements will be attached; developing many of Freedom's subsystems, such as the propulsion, external thermal management, communications and tracking, data management, guidance, navigation and control and external audio and video; outfitting three of the four nodes with these subsystems; and developing two station airlocks which are used for extravehicular activities outside the pressurized modules.

■ Work Package 3, under the management of the Goddard Space Flight Center (GSFC), involves building the free-flying, polar orbiting platform and several attachment points on the manned base for mounting scientific instruments

that look out into space or down at the Earth. GSFC is responsible also for a robot, the Flight Telerobotic Servicer, that will be capable of precise manipulations such as assisting astronauts in the assembly of the manned base or the servicing of attached payloads.

■ Work Package, 4, under the management of the Lewis Research Center (LeRC), involves developing the solar power system for the manned base and polar platform, including the power generation, conditioning and storage and distribution systems.

The Freedom program is the next logical step into the space frontier and the key to sustaining United States leadership in the exploration of space in the 21st century, by expanding the ability of humans to live and work in space for extended periods of time and by preserving the manned space infrastructure, Freedom's manned base is a building block investment in the future of our civilian space program.

Space Station Freedom will contribute enormously to technological and scientific

progress and to man's knowledge of the earth and the universe. The permanently manned base will provide an orbital stepping-stone that will enable human exploration of the solar system

Staff Offices

In addition to the program offices described above, there are several key staff offices at the Headquarters level which have significant responsibilities relative to NASA procurement, or otherwise frequently interact with NASA contractors.

OFFICE OF PROCUREMENT

The NASA Headquarters Office of Procurement has functional management responsibility for NASA's procurement programs. It develops and promulgates policies and procedures governing the operations of procurement activities for

the entire agency. It is responsible for the direction, coordination and review of all procurement functions, including planning, solicitation, evaluation, contracting, and administration. It is responsible for the implementation of the Federal Acquisition Regulation and for the development of additional procurement regulations required for the accomplishments of NASA's mission.

Other responsibilities include compilation and analysis of procurement information and the preparation of periodic and special reports on NASA procurement activities.

The Headquarters **Contracts and Grants Division** is the procuring organization for Headquarters program and staff offices. As a result of the diverse nature of Headquarters programs, this division handles a wide variety of research, study and support contracts. Like all NASA installations, it negotiates and awards grants and cooperative agreements for scientific research to qualified institutions. The division also has agency-wide responsibility for foreign procurements.

The following are typical Headquarters procurement requirements: management analysis studies in support of program and

staff offices; system engineering services; reliability studies; services relating to radio, T.V., motion pictures, exhibits, graphics and publications; automatic data processing hardware, software and related services; patent services; economic studies; and technical information services, including technical writing and foreign language translations.

The Headquarters **Space Station Freedom Procurement Office**, performs the full range of acquisition functions required to support the NASA Space Station Freedom Program Office in Reston, Virginia. The Space Station Freedom Procurement Office is co-located with the Program Office.

OFFICE OF EXTERNAL RELATIONS

The Headquarters **Office of External Relations**, through its Industry Relations Division, maintains an effective link with the community of contractors who provide hardware, support services, and engineering and program management support to NASA.

The Industry Relations Division offers a wide variety of information to industrial

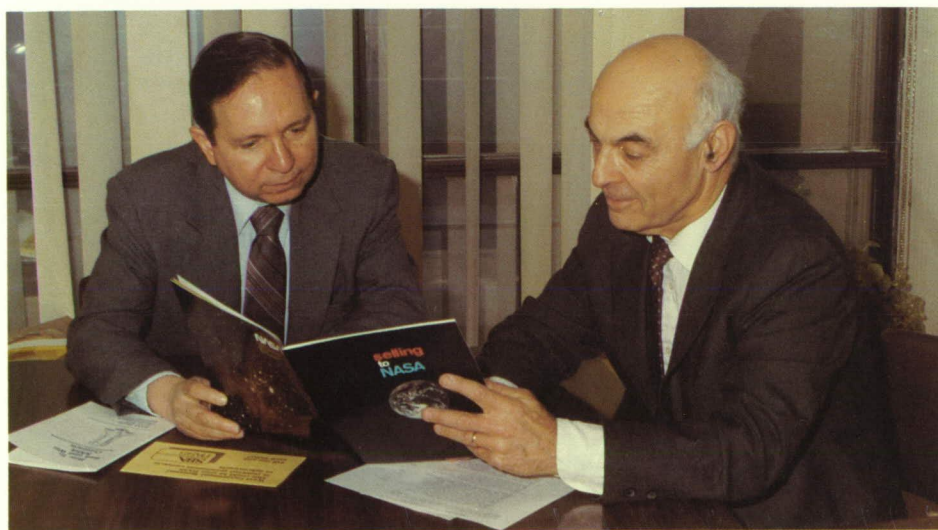
and commercial organizations seeking to do business with NASA Headquarters and its Field Installations. Trained professionals provide counseling in response to industry inquiries about NASA's needs. Documents which list anticipated major Field Installations procurements, phone books, organizational charts, long-range programmatic forecasts, and budget data (when available) are but a few samples of the Industry Relations Division's data bank. The Industry Relations Division provides industry with a fast track to a successful business relationship with NASA.

Unscheduled visits to the Industry Relations Division are welcomed.

OFFICE OF SMALL AND DISADVANTAGED BUSINESS UTILIZATION

The Headquarters **Office of Small and Disadvantaged Business Utilization** is responsible for the development and management of NASA programs to assist small businesses, as well as firms which are owned and controlled by socially and economically disadvantaged individuals. The office functionally oversees and directs the activities of corresponding offices at each NASA installation. The primary objective of the small business program is to increase the participation of small and disadvantaged businesses in NASA procurement. In support of this objective, the office offers individual counseling sessions to business people seeking advice on how to best pursue contracting opportunities with NASA (see Chapter 3). Specific guidance is provided regarding procedures for getting on solicitation mailing lists, current and planned procurement opportunities, arrangements for meetings with technical requirements personnel and various assistance or preference programs which might be available (see Chapter 4).

NASA Small Business Offices offer individual counseling sessions to businesses interested in marketing opportunities.



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C H A P T E R 2

T*he policies and procedures for conducting NASA procurements. are contained in the Federal Acquisition Regulation (FAR). The FAR, together with the NASA FAR Supplement, which contains regulations uniquely applicable to NASA, is the governing authority for NASA procurements. These documents are available from the Superintendent of Documents, Government Printing Office, Washington, DC 20402. The information presented in this chapter is intended to briefly acquaint individuals who are new to federal procurement with the basic process, but it should be understood that the actual rules and procedures are substantially more complex. The FAR, or other competent authority, should be consulted for a more thorough review of the procurement process.*

The Procurement Process

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Identification of the Requirement

The procurement process typically is initiated when a particular program or project office identifies a requirement and submits a procurement request to the procurement office. The assigned contracting officer, in consultation with the small business representative and the technical officer, will then make several key decisions. One of these is whether the required supplies or services are available from other government sources, such as stock items at a General Services Administration (GSA) supply depot, or if they may be purchased from authorized suppliers listed on a GSA Federal Supply Schedule. If so, the contracting officer must acquire the items from the depot directly or from suppliers on the schedule. Thousands of common articles (office equipment and supplies, for example) are included on the Federal Supply Schedule, and firms interested in getting their products listed should contact a Business Service Center of the GSA for additional information:

Another important decision is whether the procurement should proceed under one of the preference programs described in Chapter 4 (such as setting the procurement aside for the exclusive participation of small business). The appropriate method of conducting the procurement is also decided—whether it should be by sealed bids, competitive proposals or other competitive procedures. In rare cases, a noncompetitive procurement technique may be necessary (such as when there is only one responsible source). Once these decisions have been made, the contracting officer begins the preparation of the solicitation package and arranges for the announcement of the solicitation through various channels.



The Commerce Business Daily, Bid Rooms and Small and Minority Business Specialists at each Installation are important sources of information on NASA procurements.

Announcement of the Solicitation

Several techniques are used to inform prospective bidders of contracting opportunities. Each NASA installation maintains its own source file of information regarding the capabilities and products or services of companies expressing an interest in doing business with that installation. When a procurement need arises, a bidders list is prepared based on information in the files and other available information, and a copy of the solicitation is sent to enough companies on the list to be reasonably sure of adequate competition, appropriate to the size and nature of the procurement. (It is important to note, however, that all companies on the list are not necessarily notified of the procurement). Installations may also use other source files as necessary, such as the Small Business

Administration's Procurement Automated Source System (PASS), or the Minority Business Development Agency's PROFILE System. Instructions regarding procedures for submitting information to these agencies as well as to each NASA installation are contained in Chapter 3.

The Commerce Business Daily (CBD) is the official announcement medium for federal procurements. When the anticipated value of the contract exceeds \$25,000, a notice of the pending procurement is normally placed in the CBD at least fifteen days prior to issuance of the solicitation. A copy of the solicitation is sent to companies requesting it on a first-come, first-served basis, until the supply is exhausted. Information on contract awards and other

significant government business announcements are also included in the CBD. A subscription to this publication may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

Another source of information on NASA procurements is the bid room. Each NASA installation maintains a bid room in which all of its current solicitations are available for inspection by prospective contractors.

NASA Headquarters' Small Business Office in Washington, DC, maintains a Central Bid Room which stores open solicitations and CBD Announcements of forthcoming procurement actions which are issued by NASA facilities outside the Metropolitan Washington, DC area.

Procurement Method

Sealed Bids = IFB = Primarily
Selected
on Price

Competitive Proposals = IFB = Selected on
price, technical
capabilities and
other factors

Procurement Method

One of the first decisions made by the contracting officer is whether the procurement will be conducted using sealed bids or competitive proposals. The distinction between these two methods does not relate to the manner in which they are publicly announced, nor the extent of competition for contract awards. The primary difference between sealed bidding and competitive proposals is the way the responses to the solicitation from prospective contractors are evaluated.

Sealed Bidding

The main criterion for evaluating a response to a procurement utilizing sealed bids is price. In such procurements, the specifications or exact performance requirements can usually be clearly stated, required delivery dates are known, and the contract is simply awarded to the lowest qualified bidder.

Sealed bid procurements are particularly appropriate in supply type contracts for the purchase of standard commercial items. A solicitation under this procurement method is called an Invitation for Bids (IFB), and the response is a bid. The rules and procedures for submitting and evaluating bids in response

to an IFB are very rigid. Likewise, the performance of the contract by the successful bidder must adhere strictly to the stated specifications and the agreed upon price. (For example, an increase in materials or production costs could not be passed along to the Government).

Although sealed bidding is the preferred method of awarding contracts, NASA's heavy emphasis on research and development normally requires a more flexible contracting approach. Consequently, most NASA procurement dollars are spent utilizing competitive proposals.

Competitive Proposals

It is important to understand that solicitations using competitive proposals are normally just as widely announced and maximum competition is sought just as it is in sealed bidding. The key difference between the two methods is that competitive proposals allow for consideration of factors other than price, such as the technical capabilities of the prospective contractor and the anticipated effectiveness of the proposed approach to performance. A solicitation for competitive proposals is called a Request for Proposals (RFP), and the response is a proposal. This method is very useful for awarding research and development contracts, which comprise the bulk of NASA procurements, because exact requirements and associated costs cannot normally be specified in advance.

The selection process when competitive proposals are requested generally involves evaluation of proposals to determine which offerors are in the competitive range (i.e., have a reasonable chance of being selected), negotiations or discussions with firms in the competitive range, tentative selection of the apparently successful offeror, and final negotiation with that company prior to award of the

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Small and Minority Business Specialists are available at each installation to assist vendors in all phases of NASA procurement.

contract. The evaluation of proposals is often performed by a Source Evaluation Board, consisting of a group of NASA officials familiar with both procurement procedures and the technical requirements of the RFP. A detailed description of this evaluation-selection process is contained in the NASA Source Evaluation Board.

Construction Contracting

Although contracting for construction is in many ways similar to other procurements utilizing sealed bids, there are some unique aspects of which prospective contractors in this field should be aware. One of the most important of these is the requirement for bonding. Under the provisions of the Miller Act, NASA construction contractors are required to post performance and payment bonds, on contracts in excess of \$25,000 to protect the Government's interest in the proper and timely completion of the work,

and to secure payment for labor and material furnished under the contract. Small construction firms which may experience difficulty in obtaining a bond should inquire into the surety bond program administered by the Small Business Administration.

Special bid forms (and in some cases bid guarantees) and site inspections are additional unique aspects of construction contracting. Firms which are unfamiliar with bidding on Government construction jobs are encouraged to meet with appropriate personnel at the nearest NASA installation for a more detailed explanation of the requirements. The installation Small Business Office will assist in arranging such appointments if requested.

Architect-Engineer Contracting

Selection of Architects and Engineers (A&E) is accomplished through an Architect-Engineer Selection Board at each NASA field installation, in support of a full range of facilities and construction management activities. The Board reviews the qualifications of firms interested in performing A&E work in connection with NASA construction projects, and in the case of procurements estimated to cost more than \$10,000, the Board conducts oral or written discussions with a minimum of three firms. The Board submits a report to the installation Director recommending, in order of preference, those forms considered best qualified to perform the services required. Upon approval by the installation Director of the list of qualified A&E firms, contract negotiations are conducted with the firm given first preference. If a mutually satisfactory contract cannot be agreed to, negotiations are then initiated with the firm given second preference on the list. Generally, this procedure continues until a

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Equal Opportunity Officers are available at each NASA Installation to help contractors understand and meet equal opportunity requirements.

contract has been negotiated.

Pursuant to 10 U.S.C. 2306(d), the contract amount that may be paid to an architect-engineer for the production and delivery of the design, plans, drawings, and specifications may not exceed six per cent of the estimated cost of the related construction project, exclusive of the amount of such fee.

Since each Architect-Engineer Selection Board maintains a list of qualified firms for various types of projects, A&E firms should file Standard Form 254 (Architect-Engineer and Related Services Questionnaire) with the various NASA field installations and with NASA Headquarters, Office of Facilities. Firms are encouraged to keep their A&E qualification information current,

preferably on an annual basis. Firms may also be required to file Standard Form 255 (Architect-Engineer and Related Services Questionnaire for Specific Project), when additional information is needed on a particular project.

Additional Contracting Considerations

There are many requirements which prospective contractors must meet or agree to prior to being awarded a NASA contract. Some of the more important of these are in the areas of equal opportunity; procurement integrity; reliability maintainability and quality assurance, safety and health, industrial relations and security. Other representations and certifications may also be required. Questions in this area should be addressed to the contractor officer identified in the solicitation package.

Equal Opportunity

Pursuant to Executive Order 11246 as amended, and the rules and regulations of the Department of Labor, a standard "Equal Opportunity" clause is prescribed for use in all non-exempt contracts in excess of \$10,000. Under this clause, the contractor or subcontractor is obligated not to discriminate against any employee or applicant for employment because of race, religion, color, sex, or national origin, and is required to take affirmative action to ensure equal employment opportunity. A bidder or offeror may be required to include a representation concerning the filing of compliance reports in accordance with Equal Opportunity clause in his/her bid or proposal.

Additionally, Executive Order 11141 and the Age Discrimination in Employment Act of 1967, prohibit discrimination on the basis of age. Further, the Rehabilitation Act of 1973, as amended, and Executive Order 11758 cover non-discrimination standards with respect to the Handicapped. The Vietnam-era Veterans Readjustment Act of 1974, as amended, prescribes affirmative action requirements in the employment and advancement of qualified disabled veterans and veterans of the Vietnam era.

An Equal Opportunity Officer is available at each NASA installation to assist prospective contractors in understanding and meeting the equal opportunity requirements.

Procurement Integrity

Before a bidder or offeror may receive a contract award, the company official preparing the bid or offer will be asked to certify as to his/her knowledge of any violation of procurement integrity occurring during the conduct of the

procurement. Violations include (1) discussing or promising future employment or business opportunity to an agency official involved in the procurement (2) offering money, gratuities, or other things of value to an agency procurement official, and (3) soliciting or obtaining, directly or indirectly, from an agency officer or employee (including contractors assisting the agency in its procurement), proprietary or source selection information regarding the procurement.

Reliability, Maintainability and Quality Assurance

NASA tailors reliability and quality assurance requirements for each contract in order to effectively achieve reliability and quality commensurate with mission objectives. For space systems and their major elements, contractors are required to operate reliability and quality programs in accordance with NASA publications NHB 5300.4(1A) "Reliability Program Provisions for Aeronautical and Space System Contractors"; NHB 5300.4(1B) "Quality Assurance Program Provisions for Aeronautical and Space System Contractors"; NHB 5300.4(1E) "Maintainability Program Requirements for Space Systems", or selected provisions of these publications. Major subcontracts will invoke the same requirements. Direct NASA contracts and lesser subcontracts will invoke selected provisions of NHB 5300.4(1C) "Inspection System Provisions for Suppliers of Space Materials, Parts, Components and Services." For the Space Transportation System/Space Shuttle Program, contractor programs may have to meet the requirements of NHB 5300.4(1D-2), "Safety, Reliability, Maintainability and Quality Provisions for the Space Shuttle Program," and NHB 1700.7Am, "Safety Policy and Requirements for Payloads Using the

Space Transportation System." Other NASA, military or Federal specifications will be invoked as appropriate to the hardware involved. Copies of these publications may be obtained from the NASA installation inviting bids/proposals.

Safety and Health Program

NASA's policy is to take all practical steps to avoid loss of life, personnel injury or illness and loss of property. Specific requirements to implement this policy are found in each contract and are intended to preclude loss. In all contracts the applicable Occupational Safety and Health Act Standards are invoked. Other Federal as well as industry standards may also be included for specific areas of concern. Given the critical nature and high value of NASA operations, strict adherence to contract safety and health provisions is mandatory and will be subject to thorough evaluation during the life of the contract.

Industrial Relations

Labor relations are an important factor in contract performance. NASA has a labor policy of neutrality, and the union or non-union status of a bidder is not a scored factor in the evaluation of proposals and the award of contracts. The bidder's assessment of labor costs may be affected by the local relations environment, applicable labor agreements, and Department of Labor wage rate and fringe benefit determinations. Accordingly, bidders should be particularly aware of potential obligations resulting from legal precedents applicable to successor contracts.

Security Clearance

Should a NASA contract or solicitation require access to classified information, an industrial security clearance will be required. The procurement solicitation will cite this requirement when necessary. As a participant in the Department of Defense (DoD) Industrial Security Program, (NASA, when the the security requirement exists, will request the DoD

to process the company's application. Specific inquiries may be addressed to the procuring NASA activity. Further procedures and requirements are set forth in the "Industrial Security Manual for Safeguarding Classified Information" (DoD 5220.22M). This document may be purchased from the Superintendent of Documents.

Contract Administration

Once a contract award has been made and performance has started, the Government begins the process of contract administration. Contract administration is the responsibility of the contracting officer, but certain functions may be delegated by interagency agreement to cognizant agencies of the Department of Defense (such as the Defense Contract Administration Service and the Defense Contract Audit Agency). There are many accounting, reporting and other contractual requirements associated with performing on Government contracts, the delineation of which would be outside the scope of this publication. However, prospective contractors should be absolutely sure that all of these requirements are well understood prior to acceptance of a Government contract. NASA field installation Small Business Offices will assist companies seeking advice in this regard upon request.

The U.S. Federal Government is the largest purchaser of goods and services in the world. According to the U.S. Office of Federal Procurement Policy, U.S. federal agencies contracted \$197 billion (22 million actions) in Fiscal Year 1988. Despite this enormous expenditure, however, Government contracts are not easily obtained—competition is fierce. All firms, and particularly small companies, are finding it increasingly necessary to aggressively seek out contracting opportunities. This process requires perseverance, patience, and good business skills and judgement. The most successful companies are generally the ones which have mastered effective marketing techniques for winning contracts, and subsequently follow-through with competent contract performance.

This chapter is designed to be a primer on how to market to NASA. While the information presented is specific to NASA, many of the principles are applicable to other agencies as well. It is hoped that the following information will provide useful guidance in the development of a productive marketing program.

Marketing Your Capabilities

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Nature of the Market

Total NASA procurements with business firms totalled \$7.3 billion in FY 1988, with thousands of companies participating in the process. As a first step in selling to NASA, prospective contractors should become familiar with the predominant types of goods and services NASA buys, the locations at which they are bought, and the aggregate dollar volume of purchases in a given area. Careful consideration needs to be given to what extent NASA represents a viable market for any particular firm; i.e., how close is the match between a firm's capabilities and NASA's needs. It is important not to expend too much marketing effort in instances in which the prospect of a contract does not appear likely. This is particularly true for small companies, which normally have very limited resources for marketing. The general technical program descriptions presented in Chapter 5 may be useful in gaining a better understanding of NASA's procurement activities on a broad scale. Additionally, the Small Business Specialist at each field installation can often provide useful guidance regarding a firm's prospects for doing business with that installation.

Another useful source of procurement information in NASA's Annual Procurement Report. Summary data are presented on all procurement actions for the preceding fiscal year, with numerous tabulations reflecting awards to small versus large business, competitive versus noncompetitive awards, new contracts versus contract modifications. A list of the one hundred largest contractors according to net value of direct contract awards from NASA is also included. Although the report describes the preceding year's procurement statistics, it is a good general guideline for approximately near term future expenditures. The most recent Annual Procurement Report is available



Effective marketing of a firm's capabilities is essential in the Government market, just as it is in the private sector.

from NASA Headquarters, Office Of Procurement, Washington, DC 20546.

Once a company determines that NASA does represent a viable market, there several approaches which can be pursued simultaneously to increase the likelihood of finding specific procurement opportunities.

Get on the Solicitation Mailing List

As mentioned in Chapter 2, NASA often uses an internal Solicitation mailing list to identify potential bidders for a procurement. Since every NASA installation maintains its own list, it is essential to apply individually to each installation at which a company hopes to do business. The application consists of a Standard Form 129 generally describing the company, as well as more specific information regarding the products and/or services a firm provides. There are special forms for architect and engineering firms. The tear-out card at the back of this publication may be used to request application forms for each NASA installation.

In most cases, prospective contractors should also submit bidders mailing list applications to other Government agencies active in their field of interest. Information on appropriate procedures is normally available from each agency's Small Business Office. Two government-wide lists of particular interest are the Small Business Administration's Procurement Automated Source System (PASS), and the Minority Business Development Agency's (MBDA) PROFILE System. PASS is used by many agencies to supplement their in-house lists, and all small businesses are invited to be included in the system. PROFILE is also used Government-wide but is limited to minority-owned companies. Further information on PASS may be obtained from the nearest SBA office; information regarding PROFILE is available from any MBDA Regional Office (see Chapter 6).

Firms which market standard commercial products likely to be used by several Government agencies should also be sure their products are included on the

Federal Supply Schedule. The Schedule is updated annually, and application procedures may be obtained from the General Services Administration Business Service Centers described in Chapter 6.

It is important to respond to every solicitation received as a result of being on a bidders list, even if no bid or proposal is offered. A simple post-card or letter indicating "no bid" will suffice. Otherwise, a firm might be dropped from the list without notice. Likewise, it is advisable to keep a record of addresses to which applications have been sent, so they may be updated as the need arises.

Review the Commerce Business Daily

Because there are sometimes more companies in NASA's source system than are necessary to achieve adequate competition, it is not safe for a company to assume that because they are listed in the system they will be notified of every procurement in their field. However, by reviewing the Commerce Business Daily (CBD) each day, firms can identify interesting solicitations as they are issued, and request copies of those on which they would like to bid. Generally, all procurements over \$25,000 are synopsized in the CBD. It is almost essential for any company seriously interested in marketing to the Government to regularly review the CBD. Subscriptions may be obtained from the Superintendent of Documents, and the publication is also available in most public libraries.

Direct Marketing

One of the most productive techniques for identifying procurement opportunities within NASA is via direct contact with technical requirements personnel. Although this can be somewhat expensive and time-consuming, and does not in any way guarantee a contract or influence the

competitive selection process, it does enable contractors to develop an early and thorough understanding of NASA's requirements. This is especially important in research and development, where long-range planning and the allocation of a company's resources are essential. NASA's technical and procurement personnel welcome inquiries and discussions with appropriate company representatives. The Small Business Office at each Center will be pleased to arrange such visitations or respond to written inquiry.

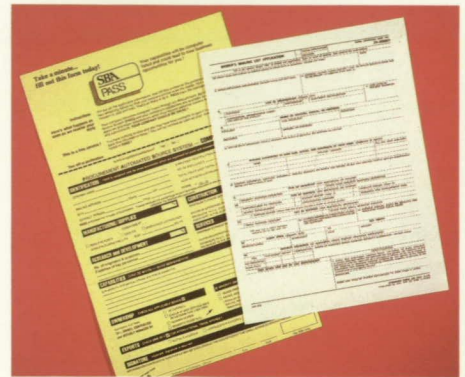
The annual Research and Technology Objectives and Plans Summary and the NASA Program Plan described in Chapter 5 are additional valuable sources of information for determining technical areas of interest and who to contact within NASA. Inquiries of a general nature or inquiries with NASA-wide implications should be addressed to the Director, NASA Office of Small and Disadvantaged Business Utilization, Washington, DC 20546.

Preparation for Proposals

The preparation of an effective proposal is perhaps the most important part of the marketing process. As a general rule, companies which are not familiar with preparing proposals for Government contracts should seek professional assistance, appropriate to the complexity of the procurement and its potential value to the company. University or private consultants, and in some cases local business assistance centers, are possible sources of such assistance. Many universities also teach evening courses or sponsor seminars on preparing proposals. It is well beyond the scope of this publication to present thorough guidelines on this complicated subject. However, the following information may be useful to acquaint firms which are inexperienced in Government contracting with some very basic requirements.

First and foremost, the instructions as stated in the solicitation must be followed exactly. Extreme care should be taken to

Getting on Solicitation Mailing Lists by submitting forms such as these is a very important step in the marketing process.



fully respond to every requirement in the exact detail called for. Delivery quantities, dates, terms, conditions, product specifications, company representations, certifications, acknowledgments, signatures and everything else requested in the solicitation must be provided in the proper format. The proposal or bid must be submitted on time. Technical proposals, which are typically required in NASA procurements, must adequately address each issue identified in the request for proposals. It is imperative to remember that the selection process only allows for consideration of what is properly presented in the proposal or bid, and does not consider outside factors, no matter how obvious.

The relative lack of flexibility in Government procurement, even under negotiated contracting procedures, is often difficult for inexperienced contractors to understand. Many contracts have been lost because a bid arrived as little as one minute too late, or because a proposal failed to sufficiently respond in an area where it was obvious the company had substantial expertise. Nevertheless, the procurement regulations have been established to ensure fair and equitable treatment for all companies bidding on Government contracts, and are therefore

rigidly enforced without exceptions for "extenuating circumstances."

All questions regarding a specific procurement should be addressed to the contracting officer identified in the solicitation. Although it may appear more convenient or direct to seek guidance from the technical project office, the contracting officer is the only official authorized to represent the Government in procurement matters.

Copies of NASA publications and technical specifications when referenced in solicitations and contracts may be obtained through the NASA contracting office. Other sources for federal or military specifications are contained in the index of Federal Specifications and Standards, and the Department of Defense Index of Specifications and Standards. These documents may be purchased from the Superintendent of Documents, Government Printing Office, Washington, DC 20402.

All firms, but particularly small firms with limited resources, should be judicious regarding the solicitations on which they bid. The process of preparing a high quality proposal is expensive and time consuming, especially in the R&D procurements frequently sought by NASA. Firms generally stand a better chance of obtaining a contract by emphasizing proposals on projects closely aligned with their capabilities, as opposed to trying to "blanket the market" by bidding on everything remotely related to their field. While this latter approach may eventually lead to an award, it is more likely to result in a series of unproductive and frustrating experiences for both NASA and the contractor.

In the event that a firm submits an unsuccessful bid or proposal, it has the right to know why. It is NASA policy that on written request, unsuccessful offerors will be debriefed after contractor selection has been announced, but normally prior to contract award. In sealed bid procurements, in which selection is predominantly based on price, debriefing is essentially accomplished at the public bid opening. The request for debriefings

or attendance at bid openings should not be regarded as establishing an adversarial relationship between NASA and the contractor; rather, it is an important part of the learning process which enables a company to submit a better proposal the next time. Small, inexperienced firms should make a special effort to understand the weaknesses in their proposals in order to become more competitive in future procurements.

Unsolicited Proposals

Although most NASA R&D contracts are awarded via standard competitive procurement procedures, another important method of doing business with NASA is through the submission of relevant new ideas and concepts in the form of unsolicited proposals. An unsolicited proposal is a written offer to perform a task or effort, prepared and submitted by an organization on its own initiative without a formal solicitation from NASA. In general, most appropriate for the unsolicited approach is research of a fundamental nature—that which bears potential for advancing the state of the art in a particular area, contributes to knowledge of a specific phenomenon, or provides fundamental advances in engineering or the sciences. In addition, proposals may define problems and present possible solutions to the problems, developmental or otherwise, which are within NASA's areas of concern.

When an organization wishes to pursue a specific research project, it is advisable to determine if the contemplated study is within NASA's scope of interests, through such sources as the open literature, published GSA testimony before Congressional Committees, or direct contracts with NASA technical personnel. However, the existence of an apparent mutual interest does not, in itself, mean NASA will support an unsolicited proposal. NASA must consider such

additional factors as the technical merits of the proposal, the availability of funds, and the relative priority of the project as compared with other alternatives under consideration.

Proposers should be aware that in most cases cost sharing by non-Federal organizations is statutorily required in any contract for research which results from an unsolicited proposal. However, exceptions for educational institutions and other organizations are possible in certain circumstances.

Guidelines for the preparation and submission of unsolicited proposals may be obtained by writing to the Small Business Specialist at any NASA Installation.

Broad Agency Announcements

In addition to the types of solicitations, Invitations for Bids and Requests for Proposals, described in Chapter 2, NASA uses broad agency announcements called Announcements of Opportunity (AOs) and NASA Research Announcements (NRAs).

AOs are used to acquire investigations which may involve special instruments to be flown aboard NASA aircraft or spacecraft. AOs describe the general nature and schedule of flights and invite investigator-initiated research proposals.

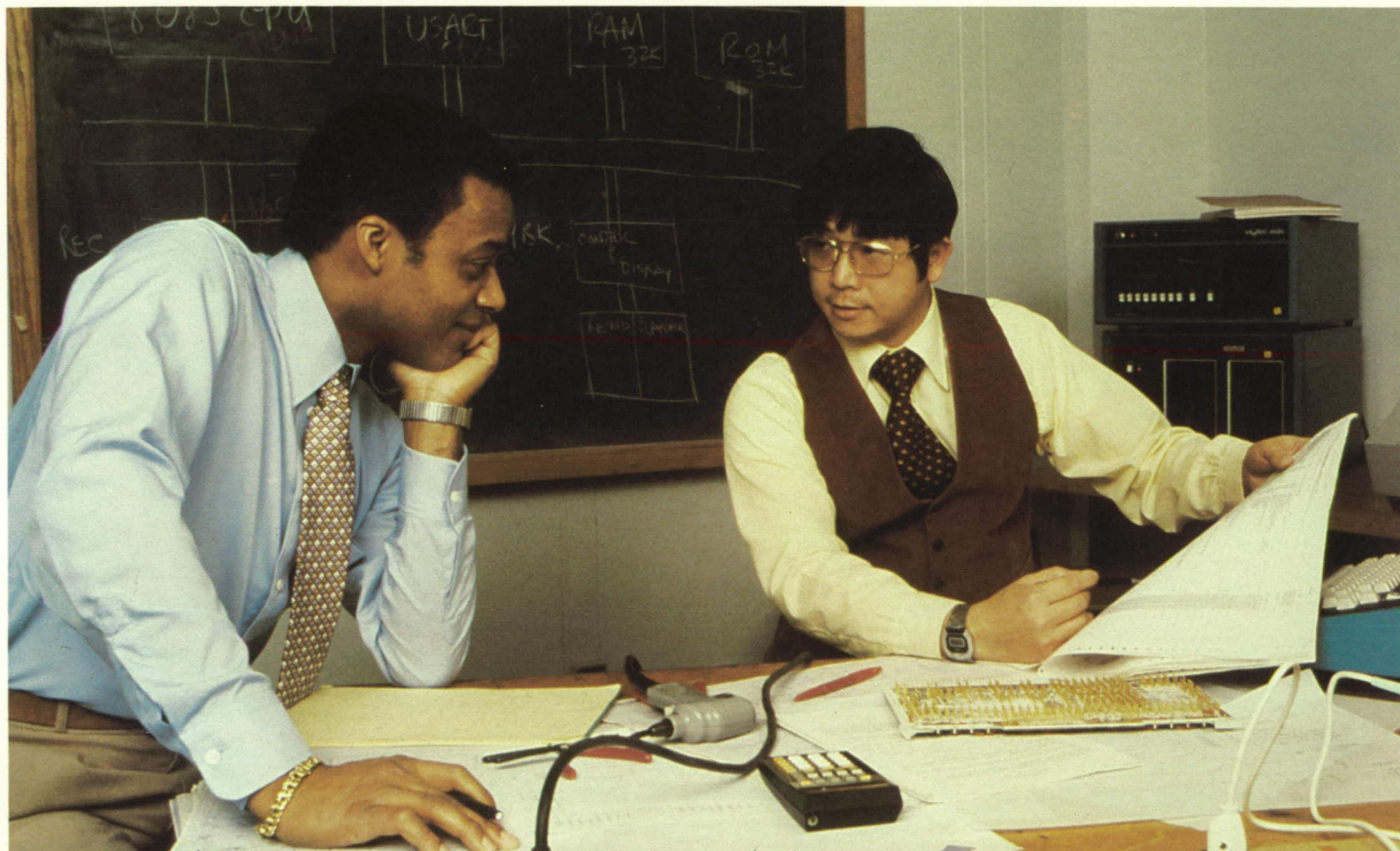
NRAs announce NASA's interest in research areas and invite proposals. Selection of proposals for funding is made following peer or scientific review using evaluation criteria in the NRA. Peer or scientific review involves evaluation, outside NASA, by discipline specialists in the area of the proposal or evaluation by in-house specialists or both.

The availability of both types of announcements, AOs and NRAs, is publicized in the CBD. The announcements are available from the offices listed in the CBD. Requests to be placed on the mailing list for these announcements should be addressed to NASA, Office of Space Science and Applications, OSSA Steering Committee, Code EPS, Washington, DC 20546.

T*he primary objective of Government procurement is to obtain required goods and services at a fair price. In many cases, however, other objectives are achieved simultaneously. To ensure that all businesses have an equitable opportunity to participate in Federal procurement, a number of special assistance programs have been established. These include various types of preference programs, such as small business set asides and programs exclusively for minority-owned companies, as well as other forms of assistance generally designed to help companies that otherwise might not be able to compete for a share of Government contract awards. All firms are encouraged to become familiar with and take advantage of any of the special assistance programs for which they qualify. This chapter is intended to be an introduction to some of the major programs primarily available to small and disadvantaged businesses.*

Special Assistance Programs

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Small companies are encouraged to visit with NASA Small Business Specialists to describe their capabilities and learn about special assistance programs for which they qualify.

Small Business Set Asides

Early in the acquisition process, all proposed NASA procurements are reviewed for the participation of small businesses. A business qualifies as being small if it, including its affiliates, is independently owned and operated, is not dominant in the area of business in which it is bidding on Government contracts, and meets certain other size-standard criteria established for each industry by the Small Business Administration (SBA). Size standards are published in the regulations of SBA (Title 13, CFR Part 121). Automatically, procurements under

\$25,000 which are subject to small purchase procedures are reserved exclusively for small business. Additionally, certain classes of acquisitions are frequently set aside for bidding by small concerns, based on past experience with particular items. Often, individual procurements are also set aside when it appears that adequate competition would result if bidding on the required goods and services was limited to small businesses.

In some instances, portions of large procurements may be set aside for exclusive small business bidding. The extent, if any, to which individual procurements are set aside and the applicable size standard are indicated in both the solicitation document and in the Commerce Business Daily announcement.

Even if a procurement is not set aside, small firms are encouraged to compete and are included in each competitive solicitation when their capabilities so indicate.

Minority Business Enterprise

NASA's Minority Business Enterprise Program is directed toward ensuring the equitable participation of minority firms in NASA prime and subcontract opportunities. In keeping with national policy, NASA works closely with the Small Business Administration (SBA) in assisting small firms owned and controlled by socially and economically

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NASA is interested in expanding its source lists to include more women-owned firms with technical expertise.

disadvantaged individuals. Socially disadvantaged individuals, for government procurement purposes, include (but are not limited to) Black Americans, Hispanic Americans, Native Americans, Asian Pacific Americans, Asian Indian Americans and other minorities, or any other individual as designated by the SBA. Economic disadvantage relates to the assets and net worth of individuals, as well as their relative access to capital and credit opportunities, as prescribed by the SBA. Under the provisions of Section 8(a) of the Small Business Act, the SBA may enter into contracts with NASA and other Government agencies for supplies and services, and then subcontract for these requirements with SBA approved small disadvantaged firms. NASA gives special emphasis to identifying procurement

requirements for referral to the SBA for matching with the capabilities and potential of approved Section 8(a) firms. Qualifying firms interested in participating in this program should contact the nearest SBA office, in addition to making their capabilities known to NASA.

Labor Surplus Area Set Asides

Under this program, competition for contracts is restricted to firms with production facilities in labor-surplus areas (areas of higher than average unemployment) even if their headquarters is not located in such areas. The firms must agree to perform most of the contract work in the labor surplus areas. Contracts are set aside when enough qualified firms are expected to bid to ensure that awards will be made at fair and reasonable prices.

The U.S. Department of Labor defines and classifies labor surplus areas. For current information on qualifying

areas, consult the publication, "Area Trends in Employment and Unemployment," available from the Superintendent of Documents, Government Printing Office, Washington, DC 20402.

Women-Owned Businesses

Public Law 100-533 dated Oct. 25, 1988, requires Federal agencies to take affirmative action in support of businesses owned by women. To carry out this order, NASA makes special efforts to advise women of business opportunities and preferential contracting programs for which they may be eligible. Bidders mailing lists are reviewed to ensure a fair representation of women-owned firms, and special conferences are sponsored to assist companies owned and controlled by women in the process of doing business with NASA.

Subcontracting Opportunities for Small Business

Subcontracting with NASA prime contractors is an important source of revenue for many companies, both small and large. For example, of the \$7.3 billion awarded to prime contractors in FY 88, \$3 billion was channeled on to subcontractors, with over \$1.1 billion going to small businesses. Typically more than half of the total NASA dollars flowing to small businesses have been awarded via subcontracts. Thus, the development of sound marketing strategies to seek out subcontracting opportunities should be an integral part of a company's overall plan to sell to the government.

Recognizing that small firms often do not have the capability to perform as a prime contractor on the larger procurements, NASA actively promotes the involvement of small business at the subcontract levels. Special contract clauses are included in most NASA prime contractor to maximize small business and minority business subcontracting opportunities. Small business firms are therefore encouraged to identify their capabilities to NASA's major prime contractors.

There are several useful sources of information to assist small businesses in determining appropriate prime contractors to contact. One of the best is the Commerce Business Daily, which publishes information on unclassified contract awards exceeding \$25,000 in value. The Small Business Administration and the Department of Defense publish directories of major Government contractors which appear to offer the greatest potential for subcontracting to small business concerns. In its Annual Procurement Report, NASA also publishes a list of the top 100 contractors

ranked according to the amount of NASA contract awards. Most of the major prime contractors have small business representatives assigned to assist small companies in understanding and responding to the needs of the prime, and many produce special publications which can be helpful. Finally, the Small Business Specialist at each NASA installation will provide guidance to small businesses seeking subcontracting opportunities.

Minority University Program

NASA's Minority University Program is designed to cultivate research ties with universities having significant numbers of minority faculty members and students whose research interests are compatible with NASA's programs and sub-contractor activities in space science and aerospace technology.

NASA's mission includes all matters pertaining to the civilian space and aeronautical research activities of the Nation. Its work includes basic and applied research for the expansion of human knowledge of phenomena in the atmosphere and space; the improvement of the usefulness, performance, speed, safety, and efficiency of aeronautical and space vehicles; the development and operation of vehicles capable of carrying instruments, equipment, supplies, and living organisms through space; and most importantly, the preservation of the role of the United States as a leader in space technology, aeronautics and a myriad of other space activities within and outside the atmosphere.

As we approach the 21st century, leadership in space takes on a new significance. NASA's partnerships with Minority Universities will enable the preservation of the strong leadership and the technical foundation which has been forged by thirty years of extraordinary space exploration by the NASA.

While NASA's mission is largely accomplished through its research and flight centers, the agency has been assisted in its endeavors by the exemplary teamwork of academia, including

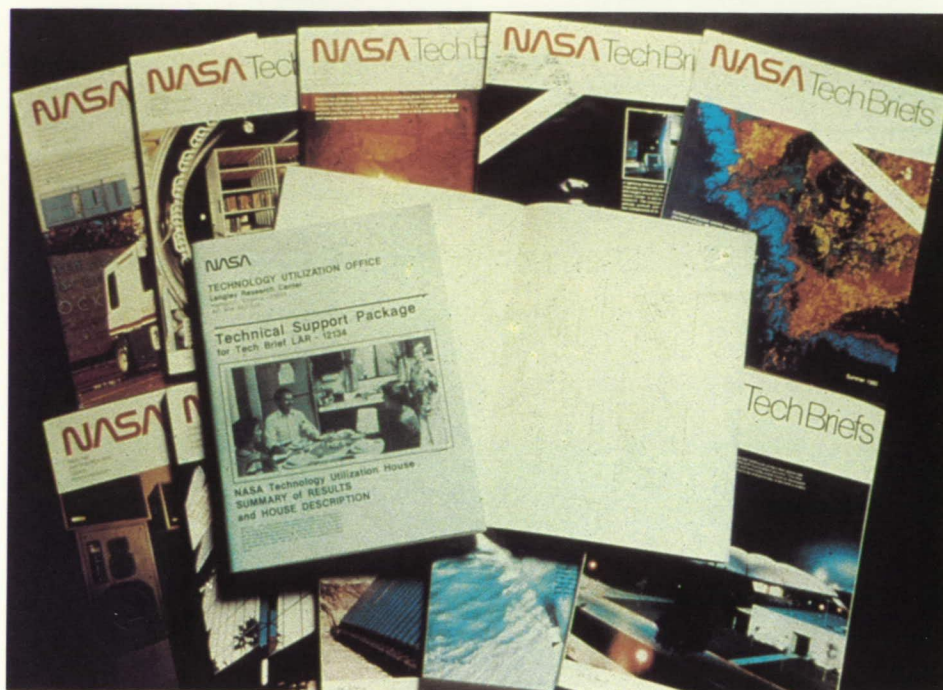
Historically Black Colleges and Universities (HBCUs) pursuant to Executive Order 12320 and other minority universities.

The initiatives and cooperation of the center directors, staff, managing scientists and engineers and principal investigators at the HBCUs and other minority universities result in projects mutually beneficial to NASA and HBCUs. NASA strongly supports the direct involvement of students in research and training efforts to ensure that minorities students gain additional motivation for research careers, and minority universities participate in all aspects of NASA's on going activities and programs.

NASA encourages the submission of scientifically and technically robust unsolicited proposals by universities in an effort to further the agency's mission in accordance with the policies and procedures in the federal acquisition Regulation (Subpart 15.5), the NASA FAR Supplement (Subpart 18-15.5), and the NASA Grant and Cooperative Agreement Handbook (Chapter 2).

The unsolicited proposal is the primary assessment mechanism by which the university is able to match its research capabilities and interests with NASA's research needs to meet the NASA's mission. Proposals are evaluated on the basis of (1) their intrinsic scientific and/or engineering merit; (2) their potential contribution to NASA's mission; and (3) availability of funds. NASA supports accepted projects through single- or multi-year grants, through cooperative agreements or contracts.

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NASA Tech Briefs can be a valuable source of information and new product ideas for small companies.

Individuals at universities contemplating the development of a proposal for submission to NASA may wish to review the 'NASA Research and Technology Objectives and Plans (RTOP) Summary,' a compilation of research currently in progress throughout NASA. By using the RTOP to determine and to identify the Agency's research needs and its technical monitors, minority university researchers can initiate communications with NASA technical personnel prior to the proposal development process and throughout.

NASA also encourages partnerships between HBCUs and the private sector as a means to further strengthen the Minority university infrastructure.

More information on NASA's Minority University Program can be obtained by writing to the Manager, Minority University Program, Office of Equal Opportunity, NASA Headquarters 600 Independence Avenue S.W., Washington, D.C. 20546

Procurement Conferences

NASA is an active participant in the Federal Procurement Conference program sponsored by the Department of Commerce predominantly to assist small business. At these conferences NASA representatives counsel many of the participants on a one-on-one basis. In addition, there are follow-ups between NASA representatives and the small businesses to assist them in their marketing with appropriate NASA technical personnel. NASA Small Business Specialists at all of the field centers also work very closely with the

local Chambers of Commerce and trade associations to advise them of NASA's needs and to aid interested firms in informing NASA of their capabilities and expertise.

Other Forms of Assistance

While the following programs are not related to procurement assistance, per se, in many cases they offer special or unique opportunities which are advantageous to small businesses.

Rights to Inventions and Data

The rights to inventions made under NASA contract and the licensing of NASA patents are governed by statute, with special consideration given to small businesses. In general, a nonprofit organization or small business firm may elect to retain title to inventions made in the performance of work under a U.S. Government contract. Inventions made by larger business firms in the manner specified by the Space Act, on the other hand, become the exclusive property of the Government, unless the NASA Administrator determines that the interests of the United States will be served by waiving all or any part of the Government's rights. In all cases, full disclosure to NASA of inventions funded by the agency is required.

It is NASA's general policy to acquire for the Government unrestricted rights to all data first produced under NASA contracts. Under certain circumstances, NASA may grant the contractor the right to copyright such data, reserving a free license under the copyright to the Government.

Detailed information concerning these policies and procedures, as well as guidelines for petitioning for waivers of

rights to contract inventions, and for making application for licenses under NASA patents, are available from the Office of General Counsel, National Aeronautics and Space Administration, Washington, DC 20546.

Monetary Awards

Although not limited to small businesses, Section 306 of the Space Act of 1958 authorizes the Administrator of NASA to make monetary awards to individuals or organizations for scientific or technical contributions "having significant value in the conduct of aeronautical or space activities." Such contributions include inventions and innovations which have been used and have proved to be of verifiable value to NASA. Many qualified contributions have been produced during the performance of contracts for NASA. For information concerning the criteria for eligibility and the procedure for submitting an application for award, write to Staff Director, Inventions and Contributions Board, National Aeronautics and Space Administration, Washington, DC 20546.

Access to Technical Information

The results of NASA research and development can often be applied by small businesses in unique and profitable ways. Numerous new products, processes and solutions to technical problems have been discovered and are available for further development. This information is distributed by NASA's Technology Utilization Programs in several forms:

NASA Tech Briefs is an indexed monthly journal containing articles on innovations and improved products or processes developed for NASA which are thought to have commercial potential. Articles are grouped into ten broad technical categories and special sections are included for books and reports, (computer programs) and new products ideas. Information on NASA's patent licensing program and additional services of the Technology Utilization Program are

also described. NASA Tech Briefs is currently distributed free to qualified companies. Requests may be directed to the address at the end of this section.

■ Ten Industrial Applications Centers (IAC) have been established by NASA to assist small business and the nonaerospace industrial sector in making profitable use of new knowledge resulting from aerospace research and development. Each IAS is based at a university or not-for profit research institute, and is staffed with specialists skilled in the use of computer search and retrieval techniques. A modest fee is charged for a variety of services offered to IAC clients. The NASA IAC network is also affiliated with many State-sponsored business and technical assistance centers located at universities nationwide which are able to assist small businesses with access to useful technologies available from NASA as well as other Federal agencies.

■ The Computer Software and Management Information Center (COSMIC) is located at the University of Georgia. COSMIC collects all of the computer programs NASA has developed (and also some of the best programs developed by other Government agencies), verifies that they operate properly, and makes them available at very reasonable prices. Program documentation is also available for evaluation of programs prior to purchase. A complete catalog of computer programs offered by COSMIC may be purchased, or individual searches for relevant programs will be performed by COSMIC upon request.

More information on the services and elements of NASA's Technology Utilization Program may be obtained by writing to: Director, Technology Utilization Division, Office of Commercial Programs, NASA Headquarters, Washington, DC 20546.

M

ost of NASA's purchases are made by the procurement offices of its field installations. For example, in FY 1988 these offices accounted for 93 percent of the total procurement dollars spent with business. Each NASA installation purchases a wide variety of components, materials, services and construction in support of its research and development and operational activities. Support services include security, fire protection, buildings and grounds maintenance, logistics support, management and administrative services, computer services and software, graphics and photography, aircraft maintenance, library and technical documentation, communications, custodial and other services. It is important, therefore, for companies marketing to NASA to become familiar with the activities and needs of each installation with which it hopes to do business. This is especially true for technical or research and development firms. While all NASA centers buy similar everyday items associated with office operation, facilities maintenance and construction, etc., the technical procurement requirements of each installation vary widely. This chapter briefly summarizes the major research programs and fields of interest at individual NASA centers.

NASA Field Installations

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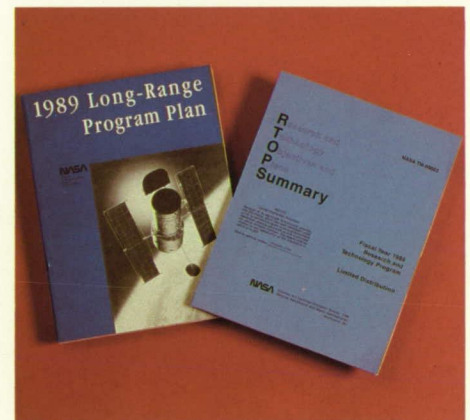
Over 93 percent of NASA's procurement dollars are spent by its Field Installations located throughout the country.

Summaries of Research Interests

NASA publishes an annual compilation of its funded research and technology programs in abstract form as the Research and Technology Objectives and Plans Summary (RTOP). The RTOP Summary is designed to facilitate communications and coordination among concerned technical personnel in government, industry, and universities. The publication briefly describes NASA's R&D objectives, identifies the installation of primary interest and provides a point of contact for technical information. The

Summary should be especially helpful to small research firms in ascertaining NASA technical requirements. It is available from the NASA Scientific and Technical Information Facility, P.O. Box 8757, Baltimore, MD 21240.

Another valuable source of information on NASA technical programs is the NASA Long-Range Program Plan, also published annually. This comprehensive document presents NASA's planned program of aeronautics and space research and development for five years into the future. It is available for review in the libraries and Small Business Offices at all NASA installations, and will be provided to qualified companies with a demonstrated need upon written request to NASA Headquarters, Small Business Office, Washington, DC 20546.



The NASA RTOP Summary and Long-Range Program Plan are very valuable sources of information on NASA's Research and Development activities.

Ames Research Center
Moffet Field, California

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Full scale model of a supersonic short take-off/vertical landing fighter, designated the E-7, in the NASA-Ames 40 x 80 windtunnel.

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Building on a series of major accomplishments which extend from 1941, the Ames Research Center is continuing to pursue National goals in aeronautics and space. Among the NASA centers it is noted for its technical excellence in life sciences, human factors and man-machine interactions, fluid dynamics and heat transfer, aerodynamics and flight dynamics, flight stability and control, and technical project management. Its facilities of superior merit include wind tunnels, manned flight simulators, high enthalpy arc jets, a life sciences laboratory complex, airborne scientific laboratories, and very advanced large scale scientific computational facilities.

As the NASA center with primary responsibility for research in the life sciences, Ames' life sciences program covers many disciplines and research areas. Aeronautics life sciences studies the relationship of the human to the aviation system in order to develop advanced cockpit controls and displays, more realistic flight simulators, and to identify and resolve human factors problems affecting air safety. Biomedical research includes developing and operating hardware and experiments for determining the effects of space light on non-human living organisms, and for providing information to solve space medicine problems. Advanced life support system research is conducted to develop techniques for sustaining human life and maintaining human efficiency in space. Extraterrestrial life detection studies are concerned with the origin of life and with the abundance and distribution of life and life-related compounds in space and on the other planets.

Ames researchers utilize a multitude of approaches in the study and advancement of aeronautics. Theoretical analyses and research in computer simulation and fluid



NASA's Quiet Short Haul Research Aircraft is Representative of Ames work in the advancement of aeronautics.

mechanics are first performed, and are then verified in wind tunnels, such as the world largest wind tunnel, the 40 x 80 x 120 National Full Scale Aeronautics Facility and the 200,000 hp Mach 0.5 to 3.5 unitary plan tunnels. Flight concepts and characteristics of proposed aircraft are checked in actual flight with research aircraft, which can simulate the flight of a range of types of aircraft. Research pilots perform flight maneuvers on the ground in flight-motion simulators, which duplicate performance of planned new aircraft. Analytical and experimental work on guidance and control is done by other researchers. Currently, the areas of greatest interest in aeronautics are in the development of vertical or short take-off and landing (V/STOL) aircraft and rotorcraft for urban regional transportation systems and for military aircraft applications, and in the development of the capability to calculate aerothermodynamic flow about aircraft.

Ames work in astronautics encompasses research in space sciences, earth applications, and spacecraft development. Associated technology

development in support of astronautics programs is concentrated on infrared sensors, cryogenics, atmosphere entry aerothermodynamics and thermal protection systems, and on computational chemistry.

Space sciences research includes astrophysics, astronomy, studies of planetary atmospheres, and climate and stratosphere research. Data for these studies are provided by aircraft, sounding rockets, balloons, and spacecraft. Earth applications is a program of research and development for the effective use of remote sensing technology for Earth related sources applications. The use of this technology is tested in a variety of users' settings-both regional and institutional. Emphasis is placed on improving the techniques for extracting useful information from remotely sensed data. Spacecraft development includes the conception, development, and operation of infrared telescopes and planetary atmosphere probes.

Flight Operations— Dryden Flight Research Facility

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Located in California's Mojave Desert, Dryden supports the landing, servicing, and ferry preparation of the Space Shuttle utilizing a specially equipped 747 pictured above.

Activities at NASA's Ames-Dryden Flight Research Facility, located on Edwards Air Force Base, are centered on high-performance aircraft flight research. Ames-Dryden is NASA's prime aeronautical test arm. The facility is located at Edwards for access to a large dry lakebed, which gives plenty of room to land experimental vehicles. Edwards also offers a clear air, good weather and low population density, and a high-speed flight corridor.

Ames-Dryden is host to most Space Shuttle landings and has extensive ground facilities to prepare orbiters for their return trip to NASA's Florida launch site atop the 747 Shuttle Carrier Aircraft.

Ames-Dryden researchers conduct experiments in flight controls systems,

propulsion systems, structures, handling qualities, systems integration, flutter and aeroelasticity, and aerodynamics. Facilities available to scientists and engineers today to explore the high-speed flight region and its effects include state-of-art computers and simulation capabilities. The Flight Loads Research Laboratory is in operation for structures experiments and is capable of heating a full-scale aircraft to 2500 degrees F for loads and heating tests. The Western Aeronautical Test Range supplies complete test mission support, such as control rooms, telemetry, radar, real-time processing displays and controls, command uplinks and data downlinks, post-mission data reduction, video, and a mobile capability that can support a test mission anywhere in the United States. Experimenters have data available from computational fluid dynamics, wind tunnels, water tunnels, simulation computers and predictions and are able to correlate this data with the final proof - actual flight test.

Researchers are currently investigating high angle of attack flight using an F/A-18 aircraft. Research in this area is limited and NASA envisions particularly useful information coming from this program.

Aeronautical flight research continues on the experimental X-29. This aircraft features sharply angled forward swept wings and makes extensive use of composite materials. The second X-29 is used for a high angle of attack flight program.

The B-52 used to launch the X-15 and lifting bodies will be used in a developmental program to air-launch a three-stage booster called Pegasus that will place a satellite in orbit.

The Ames-Dryden Highly Integrated Digital Electronic Control program, flown on the facility's F-15 aircraft, enables the flight control and propulsion systems to communicate with each other, thus providing improved performance.

The Integrated Test Facility, currently scheduled to open in 1990, will support testing of advanced aircraft and their complex, interdependent systems in a centralized location, since the ITF will accommodate up to six airplanes. Ground computers will test the aircraft's systems independently and together, giving the closest simulation to flight possible, including use of the actual airplane.

Ames-Dryden also plans to play a major role in the testing of the X-30, the research vehicle that is part of the National Aero-Space Plane program.

The Small Business Specialist at Ames Research Center is available to help firms in identifying potential procurement opportunities at both Ames and Ames-Dryden, and encourages inquiries from interested companies.

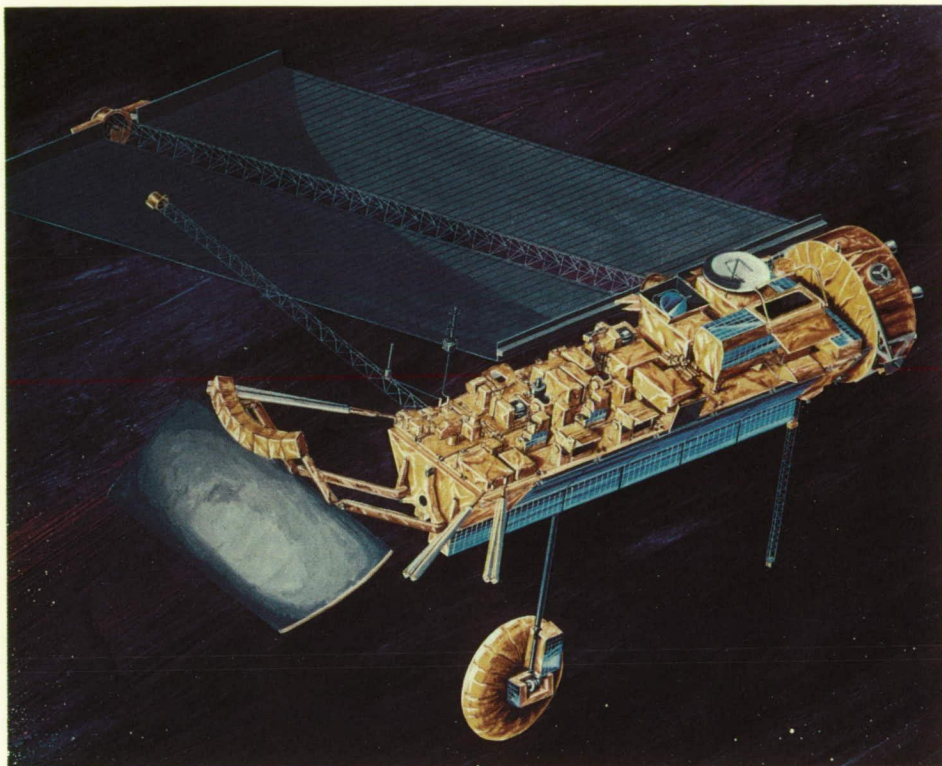
Goddard Space Flight Center

Greenbelt, Maryland

The Goddard Space Flight Center, (GSFC) was established as a major eastern field center of the National Aeronautics and Space Administration in 1959. A modern, campus-like complex of 36 buildings, the Center is situated ten miles northeast of the nation's capital on about 1,100 acres in Greenbelt, Maryland. Goddard Space Flight Center also includes approximately 6,200 acres of buildings and rocket and balloon launch facilities and 940 employees at the Wallops Flight Facility in Wallops Island, Virginia. Staffed by more than 3,700 government employees and some 8,100 contractor personnel, the Goddard team is made up of some of the world's leading groups of scientists, engineers, technicians, and administrative managers devoted to research in space science and applications, astronomy and space physics, and space tracking and communications.

Goddard's fundamental mission is to make possible the expansion of human knowledge of the Earth, its environment, the solar system and the universe through the development and use of near-Earth orbiting spacecraft. Goddard is one of the few installations in the world capable of conducting a full range space-science experimentation program from theory, through experimentation, design and construction, satellite fabrication and testing, tracking, data acquisition and reduction.

Goddard is responsible for supporting NASA's leadership role in space and Earth sciences; research and application of technology for sensors, instruments, and information systems; planning and executing space flight projects for scientific research; and for tracking of manned and unmanned Earth satellites through a worldwide communications network.



An artist's concept of the first polar-orbiting platform of the Earth Observing System (EOS).

The Center's scientific staff is concerned primarily with research into magnetic fields energetic particles, ionospheres and radio physics, planetary atmospheres, meteorology, inter-planetary matter, solar physics, communication and astronomy.

The satellite and sounding rocket programs at Goddard advance our knowledge of the Earth's environment, Sun/Earth relationship, stars, galaxies, and the physical makeup of the universe. Applications spacecraft projects are advancing technology in such areas as communications, meteorology, navigation, pollution monitoring, and the detection and monitoring of the Earth's limited natural resources.

Goddard will play a major role in the development of Space Station Freedom, a project to establish a permanent presence of man in space. As development center for Work Package 3, Goddard's role will

be to develop the detailed design, construction, test and evaluation of the automated free-flying polar platform and provisions for instruments and payloads to be attached externally to Space Station Freedom. Goddard's responsibility includes the co-orbiting free flying platform, external payload pointing systems, the servicing facility and the Flight Telerobotics Servicer.

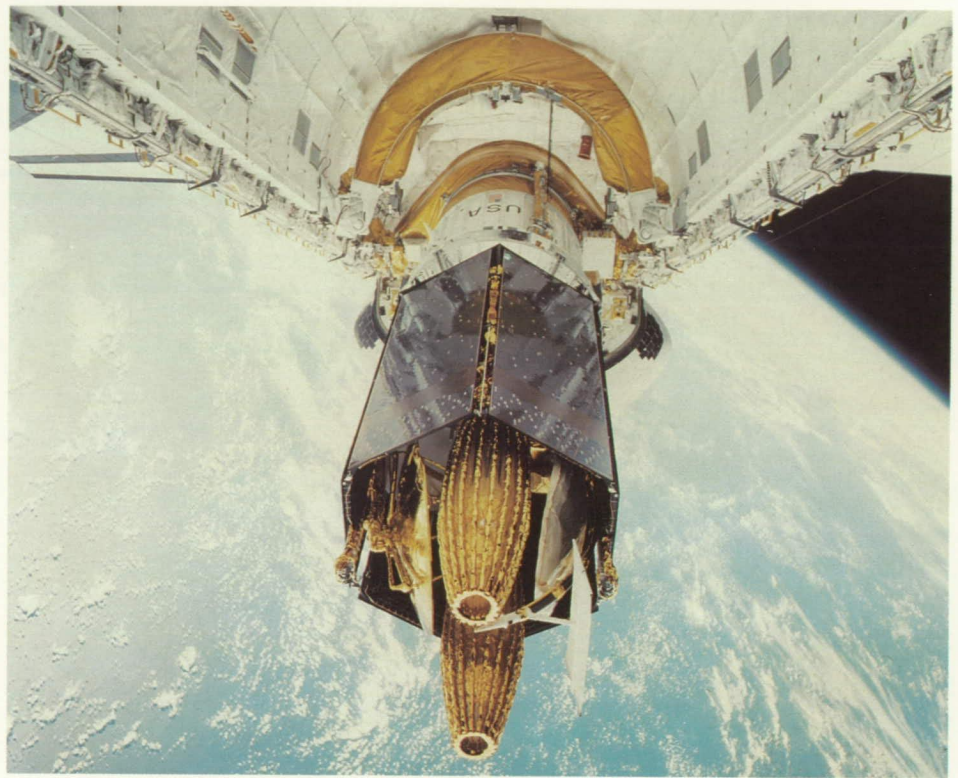
A related project in which Goddard plays a major role is the Earth Observing System (Eos), a multi-mission observation system of the 1990's to study global changes taking place in planet Earth's environment. Goddard is responsible for the first polar platform, being developed as part of the U.S. Space Station Freedom program.

A constellation of three satellites forming a new generation in satellite tracking systems was completed when Goddard's Tracking and Data Relay Satellite (TDRS-4) was launched from Kennedy Space Center on March 13, 1989. Now the system of satellites will look down from their geosynchronous orbit 22,300 miles above the earth, and track satellites and the Shuttle in lower orbits, providing nearly continuous coverage, and virtually eliminating the need for ground-based tracking stations. In addition, each of the satellites can transmit the equivalent of 300, 14-volume sets of encyclopedias per second.

Another major mission at Goddard is project management of the reliable Delta launch vehicle which has placed into orbit more than 170 successful unmanned satellites for NASA, other Federal agencies, domestic communications corporations, and numerous foreign countries.

Goddard also manages the polar-orbiting TIROS satellite system, which provides environmental data and carries search and rescue equipment, and the Geostationary Operational Environmental Satellite (GOES), which NASA manages through launch for the National Oceanic and Atmospheric Administration (NOAA) under the jurisdiction of the Metsat Projects Office. Goddard's Metsat Projects Office also manages Goddard's role in NASA's Search and Rescue program.

The Goddard-managed Hubble Space Telescope (HST) will permit astronomers to explore areas of the universe never before seen by man, enabling them to study stars many times fainter than the dimmest celestial objects yet detected. Goddard is responsible for the development of five of the HST's six instruments, the development of the instrument command and data handling



The Tracking and Data Relay Satellite (TDRS-C) and its inertial upper stage are deployed from the Space Shuttle Discovery's cargo bay during the STS-26 mission.

system; the development of the operations ground system; and the conduct of telescope operations. Once in orbit, the telescope will be operated from Goddard through its Space Telescope Operations Control Center (STOCC). Goddard also manages the Space Telescope Science Institute (STScI), a user facility where the scientific observing program is formulated on behalf of the astronomical community.

Another astronomical satellite, the Cosmic Background Explorer (COBE), will study the "Big Bang," the primeval explosion that started the expansion of the universe 15 billion years ago and will search for remnant radiation from primeval galaxies. A major in-house project, the instruments and spacecraft were designed, built and tested by Goddard engineers, scientists and technicians. Originally scheduled for launch on the Space Shuttle, the COBE

was redesigned by Goddard engineers for launch aboard a Delta expendable launch vehicle.

Other major Goddard projects include the International Solar-Terrestrial Physics project (ISTP), a combined effort involving the European Space Agency (ESA), Japan's Institute of Space and Astronautical Science (ISAS) and NASA in a series of five spaceflight missions to study the interactions in the Sun-Earth system: the Broad Band X-Ray Telescope (BBXRT) an instrument designed by Goddard as part of the Shuttle High Energy Astrophysics Laboratory (SHEAL 2), an attached Shuttle payload mission comprised of several x-ray high energy astrophysics instruments and supporting



Originally scheduled for launch aboard the Shuttle, the Cosmic Background Explorer (COBE) was completely redesigned for launch by a Delta expendable launch vehicle.

flight systems, the BBXRT will produce the first moderate-resolution x-ray spectra of a large variety of cosmic x-ray sources; two explorer missions, the X-Ray Timing Explorer (XTE) and the Extreme Ultraviolet Explorer (EUVE) which will make the first use of a reusable Explorer platform with interchangeable payloads to be replaced on-orbit; the Gamma Ray Observatory (GRO), a spacecraft which has greater capabilities for observing than any previous gamma ray mission; and the Upper Atmosphere Research Satellite (UARS) a spacecraft devoted to providing integrated global measurements of the chemistry, dynamics, and energetics of the upper atmosphere.

Some of Goddard's theoretical research is conducted at the Goddard Institute for Space Studies (GISS), in New York City. Operated in close association with the

academic community, the Institute provides supporting research in geophysics, astrophysics, astronomy and meteorology to NASA and Goddard. Dr. James Hansen, Director of the GISS is well-known for his work on global warming, or the greenhouse effect..

Goddard is also the home of the National Space Science Data Center. This facility is the central repository for the scientific data collected from space science experiments.

In October 1981, GSFC was consolidated with the Wallops Flight Facility. The facilities at Wallops are used by scientists and engineers from laboratories and research centers of NASA and other government agencies, colleges and universities, and the scientific community world-wide.

Goddard's Wallops, Virginia launch range provides vehicle assembly and launch facilities, communications,

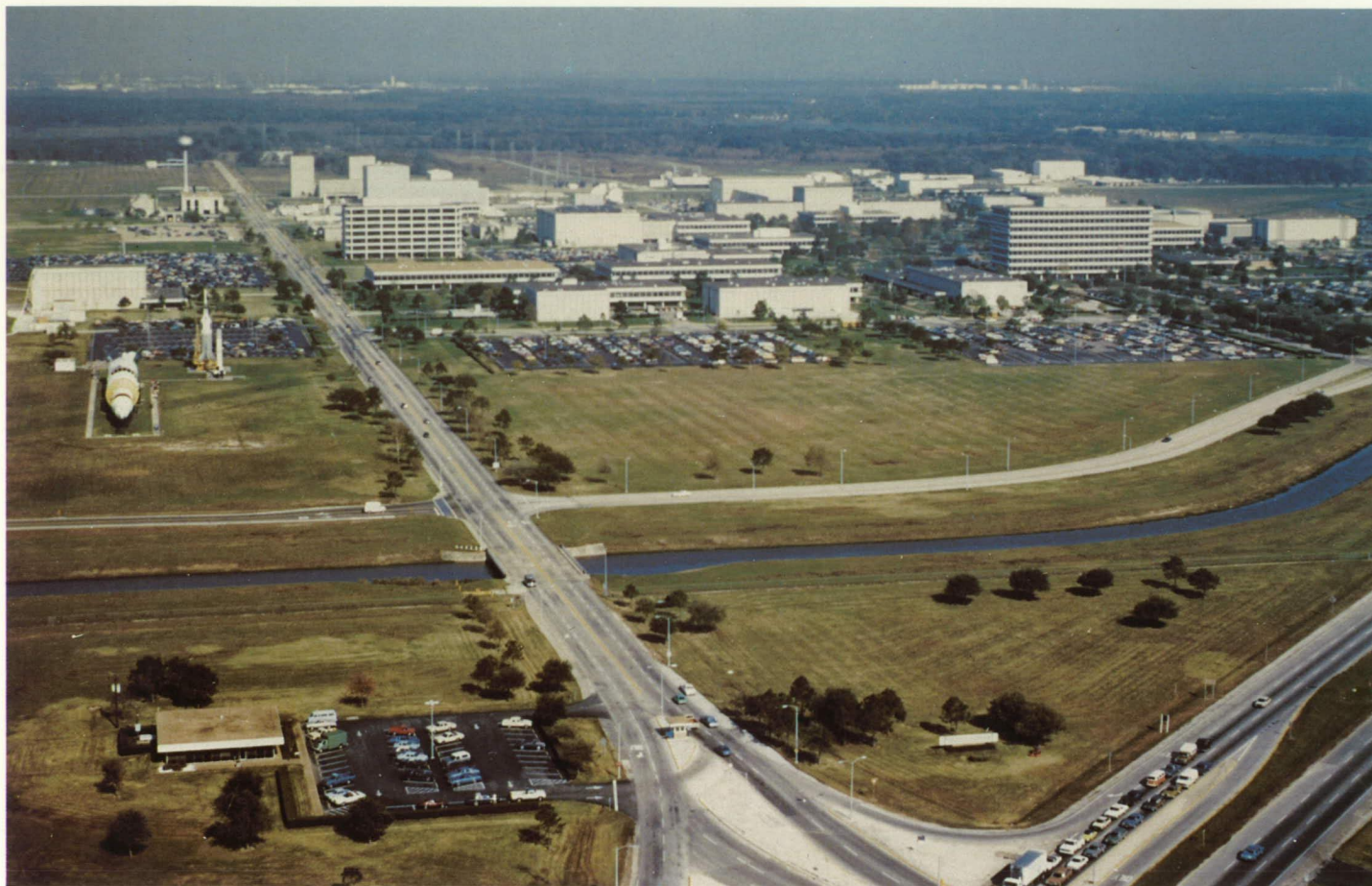
tracking instrumentation, data acquisition and data processing of sounding rockets, reentry vehicles, balloons and satellites launched from Wallops Island, and other off-site locations. To date, more than 14,000 rocket propelled space flight experiments have been successfully conducted from Wallops.

In order to maintain its active support of small and disadvantaged businesses, Goddard maintains an automated source system comprised of approximately 4,000 firms. The Center encourages businesses to submit a Solicitation Mailing List Application (SF129) to be added to the Goddard Automated Source System, and to contact its Small Business Specialist for advice on procurement opportunities.

Johnson Space Center

Houston, Texas

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Much of the 1625-acre Johnson Space Center is visible in this aerial scene (a Saturn V display can be seen at left center).

The Lyndon B. Johnson Space Center (JSC) is a focal point of the nation's manned spaceflight activities, including spacecraft development, program management, crew training, space flight operations, and related medical research and life sciences. The Center is also responsible for conducting investigations of lunar science, space science, and earth resources technology and application. The major programs which have been assigned to JSC include Mercury, Gemini, Apollo, Skylab, Apollo/Soyuz, Space Shuttle, and

Space and Life Sciences. Additionally, JSC is heavily involved in advanced planning of missions involving other planets and a possible return to the moon.

In addition to its facilities at Houston, JSC also operates the White Sands Test Facility near Las Cruces, New Mexico, for testing propulsion and power systems, and special testing of materials, components and subsystems using hazardous propellants and other fluids.

All of JSC's programs involve tremendous amounts of materials and services which must be obtained from outside the Government. Many opportunities exist for small business enterprises to participate in the furnishing of these requirements. Material needs range from raw materials and commercial

items to sophisticated spacecraft, while services range from housekeeping to engineering, medical, and scientific capabilities. The Small Business Specialist at JSC serves as a focal point to assist companies in understanding the center's needs.

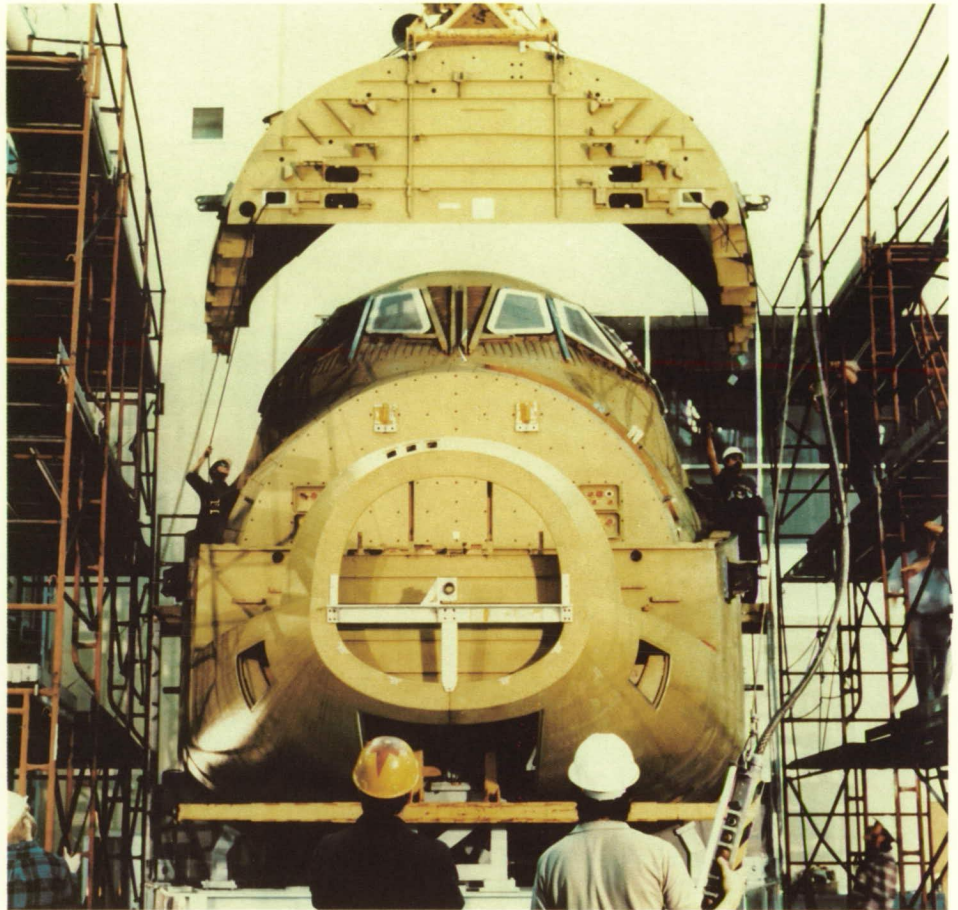
Continuing requirements exist in support of the following programs:

■ The Space Shuttle Orbiter is a reusable space airplane that carries satellites and scientific payloads into orbit. It can also serve as a service platform for repairing satellites in orbit or can be used

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to bring them back to earth for repair. JSC is lead center for the Space Shuttle, which is now operational. The Space Shuttle is an element of the Space Transportation System, which is a standardized, yet flexible system capable of accommodating a wide variety of payloads and types of missions. Other elements include payload supporting systems such as Spacelab, and upper stages. The spacelab is a joint venture between NASA and the European Space Agency to produce and operate in space a reusable laboratory that will be available to an international community of users in applied sciences, life sciences, and advanced technology. A schedule of user charges has been developed for the Space Transportation System which allows equitable payment for use and services by other agencies and nations as well as commercial enterprises.

■ In 1984, NASA was directed by the President to build and operate a space station in the 1980s and 1990s. JSC is responsible for the design of the space station's truss frame, or backbone, on which laboratory and living modules, antennas, power-generating systems, and cargo cranes will be attached. Additionally, JSC is responsible for airlocks, outfitting the interior of nodes that connect modules together, specific distributed systems, and mobile devices for servicing other space vehicles and satellites tended by the space station crews. JSC will also develop major systems for the space station, including communication and tracking, data management, guidance and control, thermal control, and extravehicular activities systems. NASA's astronauts, trained at JSC, will assemble space station segments delivered by the Space Shuttle in an extensive series of spacewalks. Later, crews will occupy the space station continuously to carry out research in life, Earth, and materials sciences.



Replacement orbiter (OV-105) undergoes fit check of lower and upper fuselages with crew module during its construction at the Downey, California facility.

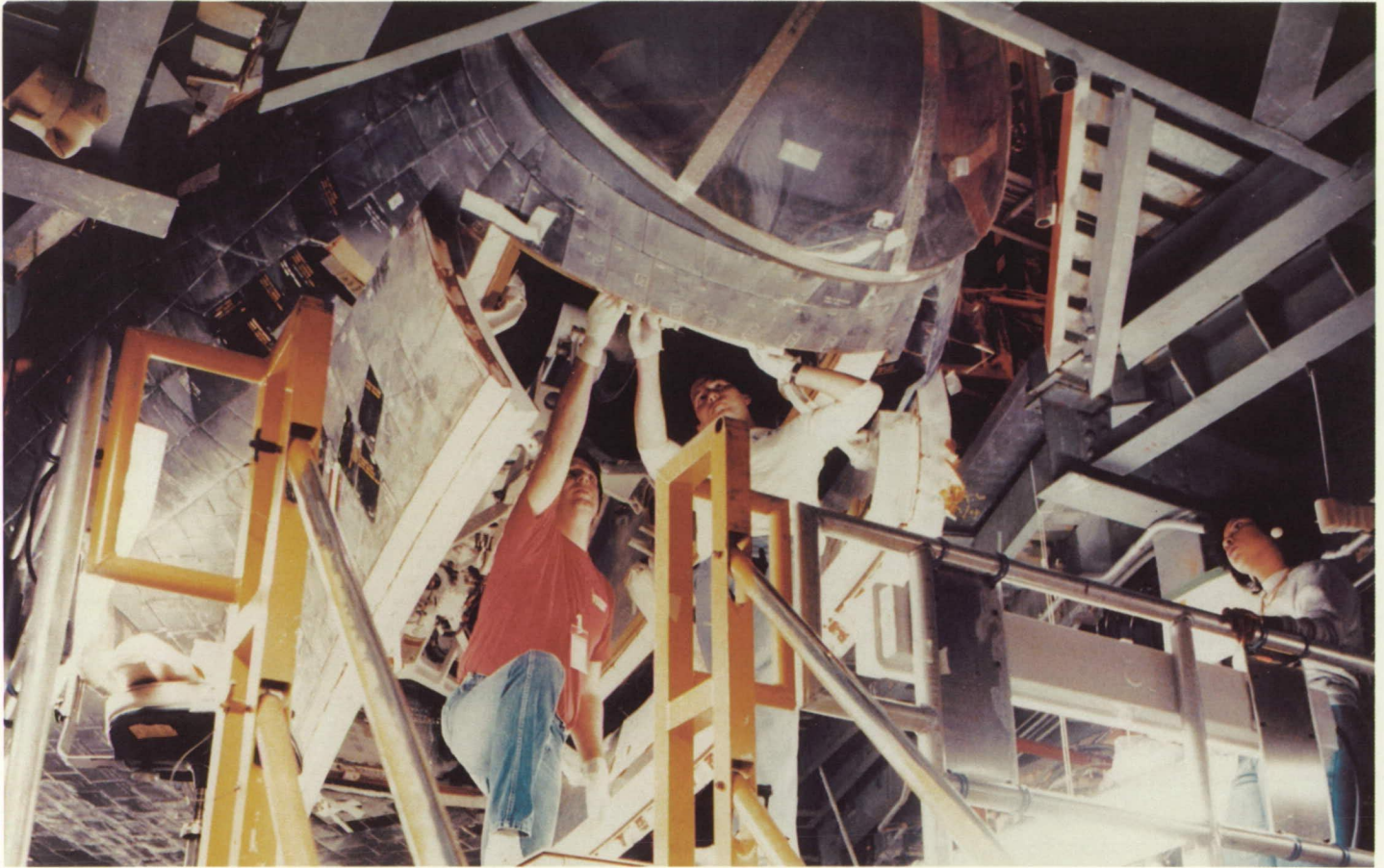
■ The Space and Life Sciences Programs includes life sciences, medical research, science experiment developing, science payload management, lunar and planetary science, and space sciences. JSC is NASA's lead center for development and managing life sciences experiments to be carried aboard Shuttle and other future space flight programs. Also, the Center manages the development and integration of experimental instrumentation and support equipment for use in space and life science programs; conducts biomedical research on the physiological stress of space flight on man; develops technology and instrumentation to

maximize crew efficiency, reliability, comfort, and safety in space flight; and manages NASA's programs to assess the environmental impact of space systems and operations.

Kennedy Space Center

Kennedy Space Center, Florida

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Technicians prepare the orbiter nose gear area for flight in the Orbiter Processing Facility at KSC.

The John F. Kennedy Space Center (KSC) is the major NASA launch organization for both manned and expendable, or unmanned, space missions. As NASA's lead launch center, KSC launched the Apollo and Skylab space vehicles, Shuttle vehicles, and is the primary launch site for the Space Transportation System (Shuttle). The Center also launches a wide variety of expendable spacecraft on an equally wide variety of missions, including earth orbital applications and scientific missions, and scientific probes to the far reaches of the solar system for exploration of other planets. In addition, the Center manages NASA launches conducted at the Western Test Range in California.

Supporting this primary mission are a host of technical and administrative

activities, including design engineering, testing, assembly and checkout of launch vehicles and payloads and associated purchasing and contracting. Technical and administrative support are provided in the following areas:

- (1) Programming, integrating and fulfilling user requirements for general purpose facilities such as offices, warehouses, maintenance buildings, utilities and roads;
- (2) Designing and constructing all NASA facilities at the Center to meet users' functional requirements;
- (3) Integrating NASA ground support equipment at launch sites for various space systems;

4) Representing NASA in coordinating with the U.S. Air Force in matters pertaining to tracking and data acquisition involving space vehicles launched from the Center as well as from NASA facilities at the Eastern and Western Test Ranges.

Small and small disadvantaged businesses are encouraged to submit a Solicitation Mailing List Application (SF 129) to the Industry Assistance Office for the purpose of being added to the KSC Automated Source System for procurements over \$25,000. A pre-recorded listing of procurements between \$10,000 and \$25,000 is available by calling Area Code (407) 867-3707.

Langley Research Center

Hampton, Virginia

The Langley Research Center (LaRC) has long been considered a world class center in aeronautical and space-related research and development. Langley has helped solve problems and develop new techniques in these areas and has earned a reputation for innovative, high quality work. From the beginning, researchers have been directly involved in the design of new facilities and the improvement of research equipment. Adapting previous methods to solve new problems continues today.

Major research fields include aeronautics and space technology, aerodynamics, materials, structures, controls, information systems, acoustics, aeroelasticity, and atmospheric sciences.

Approximately 60 percent of the work at Langley is in aeronautical research, which includes finding ways to improve aircraft that fly today and developing concepts and technology for aircraft of the future. Langley uses wind tunnels, computer modeling, and other facilities and techniques to conduct tests and research for aircraft. This research includes investigation of the full flight range, from low-speed general-aviation and transport aircraft through high-speed hypersonic vehicles.

The aeronautical research goals of the center are to develop technologies to help aircraft fly faster, farther, and be safer, and to enable these aircraft to be more maneuverable, quieter, less expensive, and more energy efficient than aircraft of the past. The aircraft industry is making good use of aeronautical concepts developed at Langley, such as the supercritical wing (an airfoil shape that reduces airplane drag and saves fuel). Lightweight yet strong composite structural materials and improved flight control systems help make aircraft safer and more efficient.

Air terminal congestion, noise, and safety are and will continue to be major concerns. Langley is studying reliable aviation electronics systems that one day will help aircraft operate more efficiently in all kinds of weather in crowded

terminal airways. Langley, in one of its many cooperative activities with the Federal Aviation Administration, is studying wind shear, with the goal of reducing its threat; wind shear currently causes over 50 percent of United States airline fatalities.

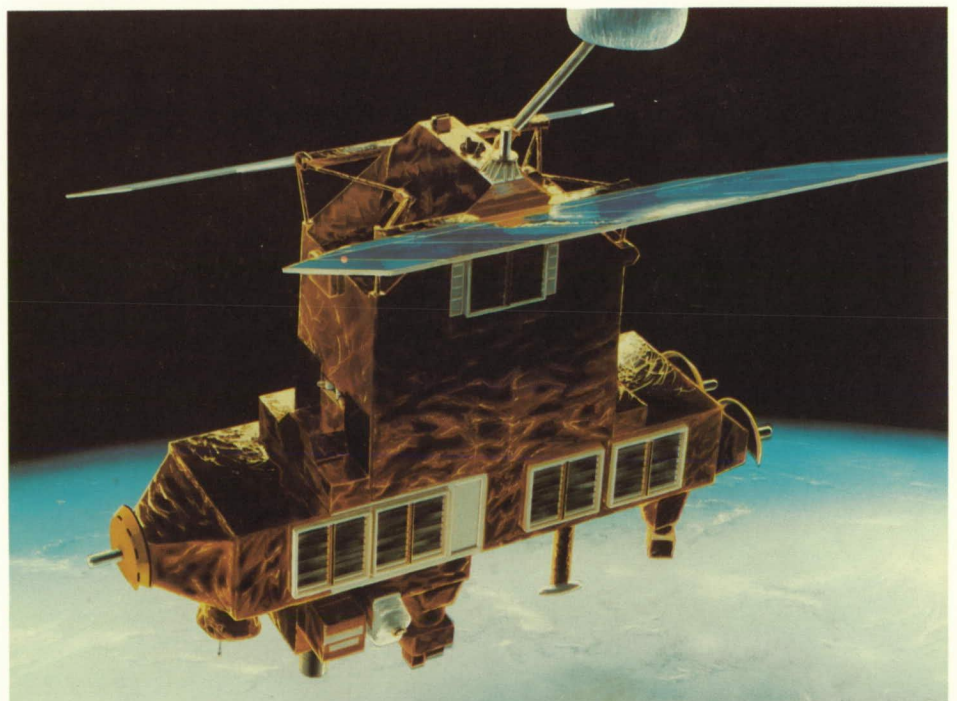
The National Aero-Space Plane is challenging researchers to expand the limits of several technologies. Improvements in air-breathing supersonic combustion ramjet engines, heat-resistant materials, and supercomputers for engine and airframe design promise to make this revolutionary concept possible. The National Aero-Space Plane is intended to be a fully reusable air and space plane that will take off horizontally from a conventional runway, accelerate to Mach 25, and achieve low-Earth orbit. It is hoped that launch costs involved in putting a "pound of payload" into space will be reduced dramatically.

A cryogenic wind tunnel, called the National Transonic Facility, is an important physical resource at Langley. Becoming operational in 1983, the facility is shared by NASA and the Department of Defense, and is available to other government agencies, industry and educational institutions.

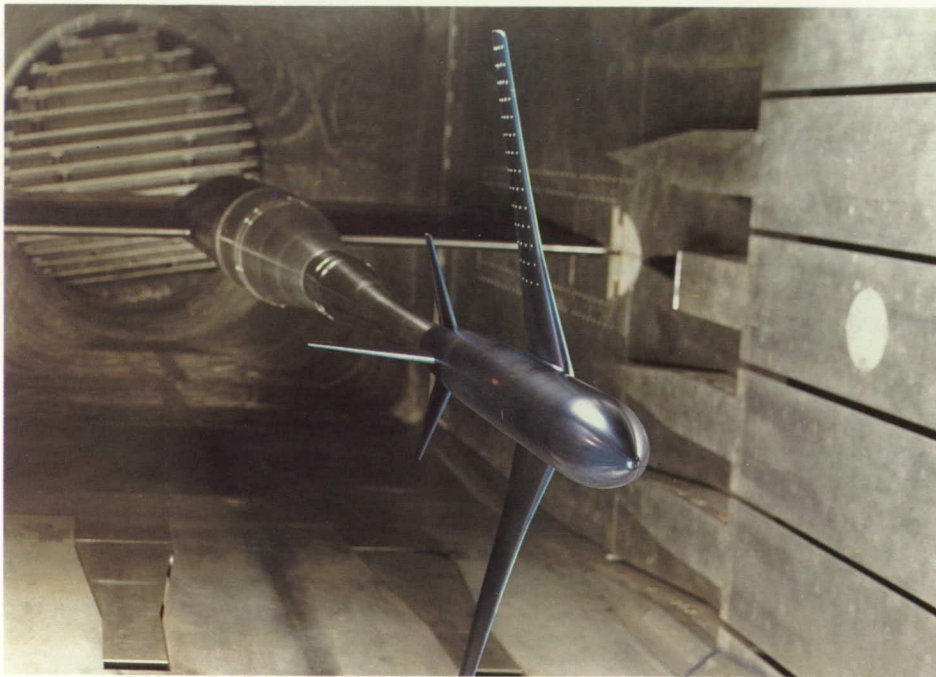
Langley has a long tradition of supporting the Department of Defense. Almost every military aircraft that flies today has been tested in a Langley wind tunnel. Special, often unique, research facilities at Langley are used extensively by the Department of Defense to support the full range of military aviation, from helicopters to supersonic fighters.

Approximately 40 percent of the work at Langley supports our national space programs. Researchers conduct studies in atmospheric and Earth sciences, identify and develop technology for advanced Space Transportation Systems, conduct

The Earth Radiation Budget Satellite, which is a free-flying observatory that is a key of the NASA Climate program, includes the ERBE and Sage II experiments. Identical ERBE experiments fly on the NOAA 9 and 10 Satellites to provide global coverage.



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An advanced transport configuration with a high-aspect ratio super critical wing undergoes testing as LaRC's National Transonic Facility.

research in laser energy conversion techniques for space applications, and provide the focal point for conceptual design activities for both Large Space Systems technology and Space Station activities. Composite materials, structures, thermal control systems, electronic systems, and robotics are also studies.

The Space Shuttle is the first manned vehicle designed to fly through the atmosphere of Earth into the near-vacuum of space. Langley researchers did extensive work on the Space Shuttle structure, aerodynamics, and thermal protection system. Several Space Shuttle payloads have been developed at Langley, including the Long-Duration Exposure Facility, filled with 57 experiments and deployed in orbit for several years; ACCESS, an erectable structure that was assembled by astronauts in the Space Shuttle payload bay; and several

sophisticated sensors that have investigated the Earth's atmosphere from orbit.

NASA is now developing a manned Space Station that could be operating in Earth orbit by the mid-1990's. Conceptual designs and evolutionary definition studies for this major national program are under way at Langley, including techniques for construction, systems engineering and integration, and general technology. Related studies investigate robotics and Large Space Systems, such as giant antennas, that may be built in Earth orbit within the next decade.

The technology of building large antenna systems in Earth orbit for several kinds of space systems is being studied at Langley. Investigations focus on ways to package these structures for delivery aboard the Space Shuttle, how to deploy them, analysis of their radio frequency performance, and even the possibility of actually manufacturing them in space.

Langley has managed the Scout launch vehicle, the smallest NASA expendable

booster rockets, for more than 25 years. More than 100 launches have put many satellites in Earth orbit for NASA, the Department of Defense, and foreign countries.

Langley also manages a specialty area in atmospheric sciences in which researchers are involved in seeking a more detailed understanding of the origins, distributions, chemistry, and transport mechanisms that govern the Earth's atmosphere. These researchers conduct theoretical studies and collect global atmospheric data from aircraft, balloons, and land-and-space-based remote sensing instruments that are designed, developed, and fabricated at Langley. These studies of the global impact of natural and man-made atmospheric phenomena provide information that is used to learn the effects that natural and human activities have on atmospheric chemical and dynamic processes. Sensors are developed to collect atmospheric data on a global scale from the ground, aircraft, and space. Two major satellite experiments are the Earth Radiation Budget Experiment (ERBE) that studies the balance of solar radiation in the Earth's atmosphere, and the Stratospheric Aerosol and Gas Experiment (SAGE) that measures ozone and aerosol concentrations in the upper level of the atmosphere. The Global Tropospheric Experiment (GTE) is a multifaceted program to study the chemistry of the lowest levels of the atmosphere to improve the understanding of global changes.

LaRC actively supports small and disadvantaged business participation in its procurement programs and encourages such companies to submit Solicitation Mailing List Applications, as well as meet with the Small Business Specialist for assistance and advice.

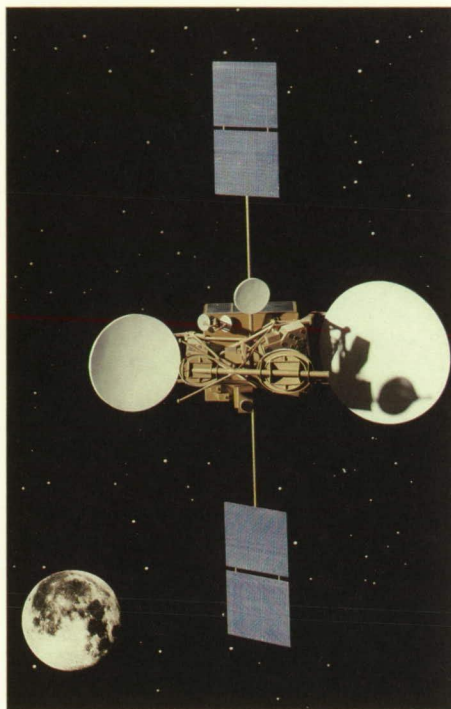
Lewis Research Center Cleveland, Ohio

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Activities at NASA's Lewis Research Center (LeRC) are directed at advancing technologies for aeropropulsion, space propulsion, space power and space science/applications.

Aeropropulsion activities at LeRC are aimed at the advancement of aeropropulsion technology, with significant and growing strategic emphasis on the needs of high-speed propulsion systems. Included in these efforts are research on high temperature (3500°F) materials, special design analysis methods, high temperature sensors, integrated fiber-optic control systems, metal-matrix and ceramic-matrix composite structures for high thrust-to-weight turbine engine cores and >3000°F turbine components.

The aeropropulsion program involves five classes of aircraft, plus generic research applicable to several of the five aircraft classes. Efforts toward subsonic transports will be directed at technologies for an ultra-high-thermal-efficiency core engine to further reduce the fuel usage of transport engines. Research efforts directed towards rotorcraft and general aviation aircraft focus on development of ceramic turbomachinery components to achieve higher operating temperatures and better fuel efficiency. In the area of supersonic transports, a major project for High Speed Civil Transports (HSCT) is being planned. Efforts in support of high-performance military aircraft includes research on high thrust-to-weight propulsion systems for short take-off and vertical landing (STOVL) aircraft. Our major effort in hypersonic aircraft involves support for the joint NASA/DOD National Aerospace Plane (NASP) Project. In addition to these efforts, LeRC will continue to conduct research into minimizing the effects of icing conditions on all aircraft, increasing operating temperature capabilities, extending life and reliability, and decreasing cost of engines.



The Advanced Communications Technology Satellite (ACTS) is the main focus of NASA's communications research and development program. It is now under development and scheduled for launch in 1992.

The space propulsion effort at LeRC includes high power (megawatts) electric propulsion, the Space Transfer Engine and advanced concepts and technology, with major emphasis on research for advanced space shuttle main engines and liquid oxygen-hydro-carbon engines for heavy-lift applications.

LeRC is firmly committed to space power efforts with the major emphasis on the following: development and operation of the space station electric power system; the SP-100 project which involves a joint NASA/DOD/DOE effort to develop the technology base for a versatile space nuclear reactor, with LeRC's emphasis being the development of the highly efficient free-piston Stirling engine; and the lunar/Mars exploration, which focuses

on power systems for early lunar or Mars outposts.

The space station focus is on the development and operation of an electric power system. This involves 75kW of large-area silicon cell photovoltaic arrays, nickel-hydrogen battery storage, and the 20-kHz end-to-end power management and distribution system, and a solar dynamic power conversion system.

Activities in our space science/applications efforts include the following: microgravity science and in-space technology experiments, including areas such as combustion, fluid physics, materials and cryogenic fluid handling; Advanced Communications Technology Satellite (ACTS) development and flight; and development of future Centaur-derived upper stages as well as management of other NASA unmanned launch services.

LeRC provides many laboratories for physical, chemical, metallurgical, and electronics research. Test cells for engine and component studies are provided with air and exhaust from central supplies. Additionally, the Center maintains a number of large, specialized facilities for simulating the environments in which engines or spacecraft may be expected to operate; i.e., altitude chambers for full scale jet engines, a facility for high pressure and high temperature tests of turbines, large supersonic wind tunnels, thrust stands for chemical rockets, and 420-foot vertical tank for zero-gravity (free-fall) tests, and large high-vacuum chambers with cryogenically-cooled walls for simulating the space environment.

The diverse nature of the research activities at LeRC offers many and varied procurement opportunities for small and disadvantaged firms. These companies are encouraged to seek the assistance of LeRC's Small Business Specialist.

Marshall Space Flight Center

Huntsville, Alabama

The Marshall Space Flight Center (MSFC) serves as one of the primary NASA centers for the design and development of space transportation systems, orbital systems, scientific and applications payloads, and other systems for present and future space exploration. Principal Marshall roles include rocket propulsion systems; design and development of manned vehicle systems; Spacelab mission management and payload definition; design and development of large, complex and specialized automated spacecraft; and management of space processing activities. Also, MSFC has a primary role in the development and processing of science and applications experiments and for the conduct of energy-related system studies. In addition, Marshall conducts a vigorous research and technology program and is involved in the study and definition of future programs, including the development of complex space structures, space propulsion systems, materials engineering, materials processing in space experiments, satellite power system definition, fundamental electronics, and payload systems analysis and integration.

Major programs of MSFC include:

■ **Space Shuttle.** The primary design and operations goal for the Space Shuttle program is to provide safe, reliable, and low-cost transportation to and from Earth orbit. Marshall is responsible for the design, development, test and evaluation of the Space Shuttle Main Engine, the Solid Rocket Booster, the Solid Rocket Motor, and the External Tank. Major Space Shuttle vehicle and component testing also is being conducted by MSFC. A vital Shuttle effort being managed at MSFC is the Advanced Solid Rocket Motor (ASRM) which NASA plans to develop as a means of materially improving the safety, reliability and performance levels of the current Redesigned Solid Rocket Motor.

■ **Spacelab.** Marshall has program responsibility for this major international cooperative program between NASA and the European Space Agency, which has been developed as a key element of the Space Transportation System. Designed as a versatile modular laboratory to be carried in the Shuttle Orbiter bay, Spacelab is a stepping-stone to Space Station Freedom. It provides researchers with modules in which they can conduct research, and unpressurized pallets which hold instruments requiring direct exposure to space.

■ **Payloads and Missions.** Marshall has mission management responsibility for many of the Spacelab missions and for other important scientific missions flown aboard the Space Shuttle. Marshall's mission management responsibility includes providing the focal point for planning, integration, training, and operations. The center is also responsible for definition and development of some instruments and equipment, and for maintaining the interface between the user community and the Space Transportation System.

■ **Materials Processing in Space.** Marshall is responsible within NASA for exploring and developing the potential for materials processing in space. The space environment offers a freedom from the influence of gravity that cannot be achieved on Earth for more than a few seconds. Growth of superior single crystals for solid state electronics, pure metals and alloys, high-strength composite materials, and separation of living cells for pharmaceutical products all show great promise.

■ **Space Telescopes.** The Hubble Space Telescope, managed by MSFC, will be the largest optical telescope ever placed in orbit. When launched by the Space Shuttle in late 1989, it will enable astronomers to see planets, stars and other objects about 10 times better than now possible with the best Earth-based optical telescopes. From

its vantage point above the Earth's obscuring atmosphere, it will observe the universe for 15 years or more. Designed for servicing while in orbit, it will be visited every few years by astronauts who will do routine maintenance and replace instruments as technology improves. The telescope is the first of NASA's four "Great Observatories." The Advanced X-Ray Astrophysics Facility, also is being managed by Marshall, is another of the "Great Observatories". This orbiting facility is to be launched in the mid-1990's. It will study x-ray emissions from some of the most violent events in the universe — neutron stars, pulsars, quasars and black holes — which can penetrate the clouds of dust and interstellar debris which otherwise shroud many galactic and intergalactic mysteries.

■ **Flight Experiments.** Marshall is active in the development of flight experiments for the Space Shuttle and other vehicles and currently has more than 20 experiments approved for flight. Examples include the study of gamma ray bursts and transients; evaluation of the potential for tracking and prediction of severe storms by satellite; materials processing; and experiments to determine the effects of long duration exposure of materials and equipment to a space environment.

■ **Space Station.** In the development of Space Station Freedom, MSFC has responsibility for designing the Habitation and Laboratory Modules where crew members will live and work. Marshall also has responsibility for the logistics elements, fabrication of the primary structure for the Resource Nodes, development of the Environmental Control and Life Support System, internal components of the audio/video and thermal control systems, as well as for operational capability development for users in the Laboratory Module.



Once in orbit above the Earth's distorting atmosphere, NASA's Hubble Space Telescope, the largest astronomical observatory ever placed in orbit, will alter our perceptions of the universe — perhaps as dramatically as Galileo's telescope revolutionized thought almost 400 years ago.

■ **Upper Stages.** Marshall has been designated the lead Center for the Inertial Upper Stage, the Transfer Orbital Stage and the Payload Assist Module for the Shuttle, PAM-S. The primary objective of the Inertial Upper Stage, a highly reliable, expendable upper stage system carried into orbit in the cargo bay of the Space Shuttle, is to deliver Department of Defense and NASA spacecraft to high-energy orbits unattainable with the basic Space Shuttle capability. The Transfer Orbital Stage is a medium-capacity upper stage developed to place satellite payloads into geosynchronous transfer orbit or other high energy trajectories. The Shuttle Payload Assist Module is a smaller capacity motor, which will be combined with an Inertial Upper Stage to take the Ulysses spacecraft from the Shuttle to a rendezvous with Jupiter.

■ **Orbital Maneuvering Vehicle.** The Orbital Maneuvering Vehicle is a reusable space utility tug designed to economically deliver and retrieve payloads and satellites at orbits not otherwise achievable. It is an important element of the Space Transportation System that may be Shuttle-based or space station-based. Available to commercial, scientific, and military users and adaptable to specific missions, the OMV will be a vital link in the evolution of spacecraft from single-role to general purpose vehicles.

■ **Future Space Systems.** Marshall has the lead for development of the Shuttle-C, an unmanned cargo element which would give greater flexibility to the present Space Transportation System and would provide an Earth-to-orbit lift capability up to three times that of the present Space Shuttle. Marshall also has the lead for development of propulsion technology for the Advanced Launch System, designed to reduce costs of placing cargos in Earth orbit by an order of magnitude. The

Center will play a major role in any future plans to return to colonize the Moon or send manned and unmanned exploration vehicles to Mars. Closer to home, future Marshall programs are aimed at obtaining better understanding of the planet on which we live.

Overall, MSFC is a broad spectrum engineering, science, research and

development facility which offers NASA a wide range of talents. MSFC is currently engaged in more projects than at any other time in its history. The Center also operates the Michoud Assembly Facility in New Orleans, the Slidell Computer complex in Louisiana, and tests space shuttle main engines at the Stennis Space Center in Mississippi.

The Space Shuttle Discovery (Mission STS-26) on September 29, 1988 incorporated hundreds of MSFC-derived improvements to its motors, boosters, main engines and external tank when it took America back to space.



John C. Stennis Space Center

Stennis Space Center, Mississippi

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Static test firing of the Space Shuttle main engine at John C. Stennis Space Center.

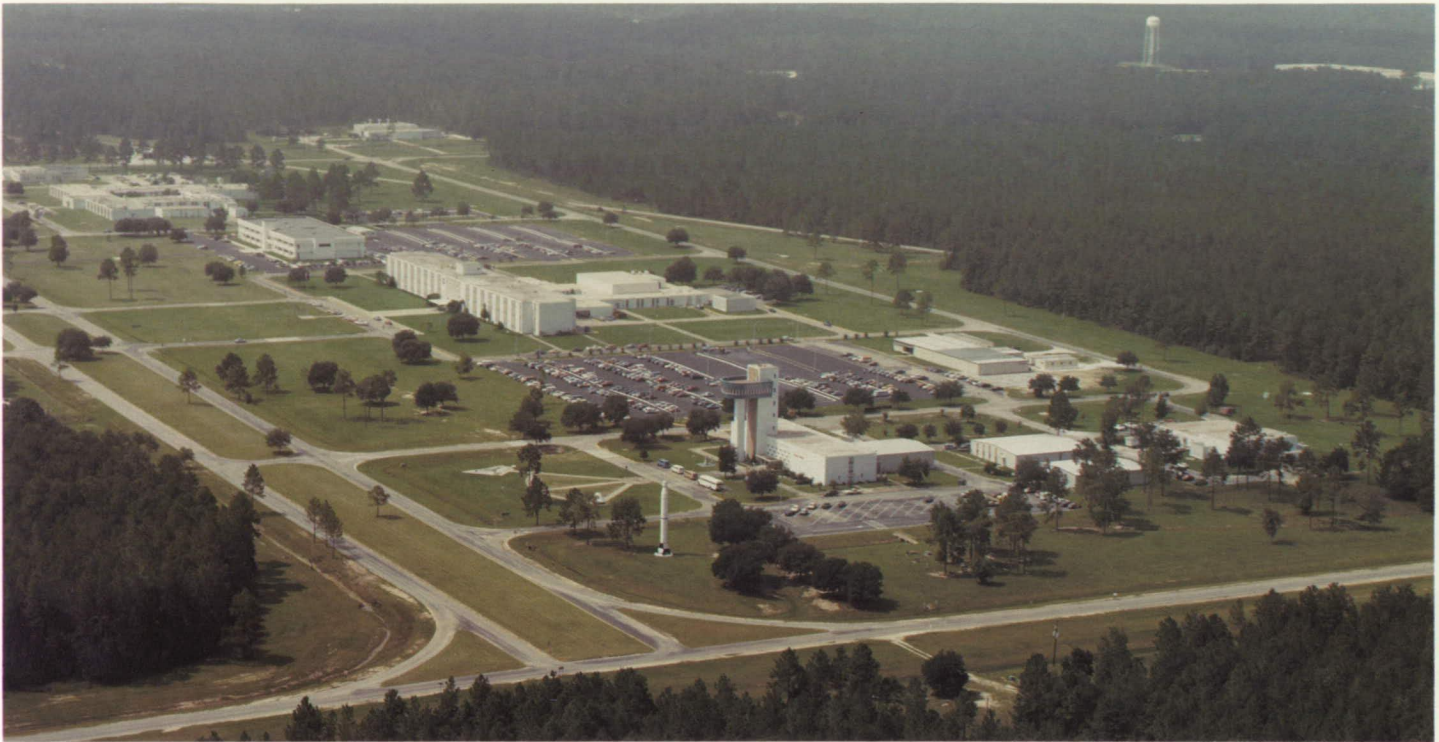
The John C. Stennis Space Center (SSC) is the prime NASA installation for static test firing of large rocket engines and propulsion systems. SSC is the second largest NASA Center, occupying 13,480 acres and surrounded by a 125,327 acre unpopulated Buffer Zone. The Center is located on the Mississippi Gulf Coast and is the site of several major science and

technology programs. A significant advantage of the facility is the availability of all forms of transportation, including a direct water transportation route to the Gulf of Mexico and through the Intracoastal Waterway to Kennedy Space Center.

SSC evolved from the former Mississippi Test Facility (MTF) which had been constructed, activated, and operated during the sixties for acceptance testing of booster stages of the Saturn V rocket

system. The redesignation by NASA of the Mississippi Test Facility as the National Space Technology laboratories in June 1974, recognized the expanded role the installation was playing in the nation's space and environmental efforts, in addition to remaining the prime static test facility for large liquid propellant rocket engine systems. The redesignation further recognized the increasing numbers of

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Stennis Space Center's administrative complex is shown in this aerial photo. The 90-foot observation tower distinguishes the Visitors Center.

NASA and non-NASA programs being accomplished by resident elements at the facility.

In May 1988, the Center was rededicated to become the John C. Stennis Space Center, named for the Mississippi senator whose personal involvement has been crucial to the evolution of the installation into a center of excellence that has received both national and international recognition.

At present, SSC has as its main mission the support of development testing of the Space Shuttle main engine and of large propulsion systems. All main engines used to power the Space Shuttle are proven acceptable for flight at Stennis before an actual mission. In support of the Space Shuttle, SSC maintains dedicated facilities used for developmental testing including a high

pressure industrial water facility, emergency power capabilities, high pressure gas facilities (up to 6000 psi), propellant and cryogenic facilities, and support laboratories and shops.

Secondly, the Center's Science and Technology Laboratory conducts scientific and engineering research in land and oceanographic remote sensing, sensor and data systems, life and environmental sciences; and applies these technologies to both SSC propulsion testing and needs in the private sector. SSC has the lead role for NASA in the commercialization of remote sensing technologies.

NASA's third mission at Stennis is to provide and manage a wide range of facilities and serves on a reimbursable basis to the 19 resident federal and state agencies on site. The resident agencies include elements of the Department of Defense (U.S. Navy and U.S. Army), National Oceanic and Atmospheric Administration, Department of the

Interior, Environmental Protection Agency, and others.

The future is bright for the Stennis Space Center. SSC has been designated as the testing site for the new Advanced Solid Rocket Motor soon to be developed. In addition, a new \$40 million high pressure component test facility is being constructed to begin development of this country's next generation launch vehicle—the Advanced Launch System (ALS).

Although the value of NASA procurement at SSC is smaller than many of the other centers, unique opportunities may exist for firms with specialized technical expertise, as well as for companies with facilities management and support capabilities. The Small Business Specialist at SSC may be contacted for additional guidance.

Jet Propulsion Laboratory

Pasadena, California

The Jet Propulsion Laboratory (JPL) of the California Institute of Technology is a Government-owned research, development and flight center that performs a variety of tasks for NASA. JPL works under contract to NASA Headquarters with day-to-day coordination provided by the NASA Resident Office.

JPL's primary mission is the scientific exploration of the solar system through investigation of the planets, their satellites and deep space, using automated spacecraft. Also, the laboratory is responsible to NASA for supporting research and advanced development related to flight projects, as well as the management and operation of the Deep Space Network in support of those projects.

In addition, JPL conducts selected projects to develop and apply new technologies to the solution of problems on Earth as well as in space, including research and development into energy sources, concurrent computers, neural networks using light for interconnections and advanced laser technology, among others. These projects are sponsored by other government departments and agencies with the approval of NASA.

JPL's current and upcoming tasks include the last planetary encounter of the Voyager mission to the outer solar system and the continued exploration of other planets. Voyager 2, to encounter Neptune and its major moon, Triton, in August 1989, will continue to return science data on the solar wind for another 20 years.



Photo of the Magellan spacecraft, which is attached to an Inertial Upper State (IUS) rocket (the Magellan program is managed by JPL).

The Magellan mission will map, with radar, the surface of Venus and define its gravity profile during the early 1990s. Galileo, scheduled for an October 1989 launch will encounter Jupiter in 1995, probe its atmosphere and investigate its Galilean moons for nearly two more years. Also, missions are scheduled to Saturn and to fly by an asteroid and rendezvous with a comet in the 1990s, using low-cost spacecraft in the Mariner Mark II program.

Supporting research and advanced development are conducted in electric propulsion, nuclear power, chemical propulsion, aero-thermodynamics, fluid physics and electrophysics, applied mathematics, space power generation, optical and radio astronomy, planetary atmospheres, fields and particles, long-range communications, guidance and control, and systems simulation and analysis techniques. These programs make

a substantial contribution to NASA programs in propulsion, tracking and data acquisition and planetary exploration.

JPL will have a lead role in the Earth Observing System project to include instrument-laden, polar-orbiting platforms in a multi-disciplinary study of Earth's oceans, atmosphere and land.

Many of the technical advancements required for the success of lunar, planetary and space exploration also are applicable to problems of critical national interest. Under the direction of NASA, JPL is expending considerable effort in the application of space-derived skills and capabilities to needs of the civil sector.

Because of the heavy emphasis on research and development, large quantity buys are seldom purchased at JPL, with the exception of some electronic components.

A significant portion of the total JPL procurement budget is spent on the following products and services: fabrication, electronic components, electronic instrumentation and test equipment, miscellaneous facility supplies and services, automatic data processing equipment, and construction.

Either the Small Business Specialist or Minority Business Specialist at JPL, or the Small Business Specialist at the NASA Resident Office will assist companies in identifying procurement opportunities at JPL.

C H A P T E R 6

Several key Government agencies offer major assistance programs and other services to small businesses.

Although the Federal Government is extremely complex, there are several excellent sources of information and guidance which can be very useful to small and disadvantaged businesses. Some of the key government agencies and their services or publications are briefly described in this chapter.



Sources of Additional Help

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All Government Agencies

Public Law 95-507 requires each Federal agency having procurement powers to establish an Office of Small and Disadvantaged Business Utilization to assist small and minority businesses. These offices are staffed with individuals dedicated to helping small companies do business with their agency, and are an excellent source of information and assistance. The name, address and phone number of the Small and Minority Business Specialist at each NASA Installation are listed at the end of this chapter.

Small Business Administration

The Small Business Administration (SBA) has numerous programs to help small businesses, ranging from free publications to technical assistance. SBA services are provided through local field offices at major cities throughout the country. These offices are listed under "U.S. Government" in the appropriate telephone directory, and the NASA Small Business Specialist at any installation can direct companies to the nearest SBA office as well. All small businesses are encouraged to avail themselves of the many publications, services and programs provided by the SBA. Two particularly useful publications produced by SBA are the "Small Business Subcontracting Directory," which lists major prime contractors with high potential for subcontracting, and the "U.S. Government Purchasing and Sales Directory," which is a guideline to which government agencies buy particular goods and services. For more information on these publications, and other SBA services, contact the nearest SBA office.



There are many useful publications which are available to assist small firms in their efforts to do business with the Government.

Department of Commerce

As the main business agency of the government, the Department of Commerce offers various types of assistance and guidance to small businesses. A special program called "Business Assistance Program" under cognizance of the Commerce Department's Office of Business Liaison, has been created to help companies find their way through the myriad of federal agencies to find answers to business related questions in areas such as international trade, business licenses, franchising and others. More information may be obtained by writing to Office of Business Liaison, U.S. Department of Commerce, Rm. 5898C, Washington, DC 20230.

The Minority Business Development Agency (MBDA) is an agency of the Department of Commerce specifically

established to provide comprehensive assistance services to minority businesses. MBDA services are provided primarily through a nation-wide network of Minority Business Development Centers. MBDA regional offices in Atlanta, Chicago, Dallas, New York, San Francisco and Washington, D.C. will provide the name and telephone number of the nearest Minority Business Development Center upon request.

The National Technical Information Service (NTIS) is sponsored by the Department of Commerce to provide access to millions of technical documents and reports resulting from federal programs. The publications and services of NTIS are made available for a reasonable price which reflects the cost of providing them. For a free copy of the NTIS Products and Services catalog, write NTIS, Springfield, VA 22161.

General Services Administration

The General Services Administration (GSA) acts as the purchasing agency for numerous items of equipment and supplies, as well as services used by federal agencies. A small business can learn of items bought by GSA by writing to or visiting the nearest GSA Business Service Center. These offices are located in Atlanta, Boston, Chicago, Denver, Fort Worth, Kansas City, Los Angeles, New York, Philadelphia, San Francisco, Seattle, and Washington, DC.

The General Services Administration also supports a network of Federal Information Centers, which are staffed to provide or locate sources of information on all federal programs and services, and help to find answers to both business and consumer-related questions. The centers are listed as "Federal Information Center" under U.S. Government in the telephone directories of approximately seventy major cities, and a list of all the centers is available by writing to the Consumer Information Center, Pueblo, Colorado 81009.

Additional Publications

There is a wealth of material available to provide information to small and minority entrepreneurs, much of it is available through agency Offices of Small and Disadvantaged Business Utilization.

The Department of Defense (DoD) produces numerous valuable documents,

including a directory of major prime contractors offering subcontracting opportunities. An extremely useful publication for small R&D companies, entitled "Small Business Guide to Federal R&D Funding Opportunities," is published by the National Science Foundation. Another handy tool is "A Guide for Private Industry." It tells how to obtain information regarding specifications and standards from the DoD Single Stock Point for Specifications and Standards. Also, DoD provides the "DoD Small and Disadvantaged Business Utilization Specialists (SADBUS)". This lists (on a nationwide basis) DoD SADBUS by name, location, and telephone number.

The "Handbook for Small Business: A Survey of Small Business Programs of the Federal Government", compiled by the U.S. Senate Committee on Small Business, is another useful guide to Federal small business programs. It contains information on Government-sponsored loans and financial guarantees, management and technical assistance and programs, Government purchasing and sales programs, grants, and entering the world trade markets. It outlines design of Federal programs, describes each program, and indicates how and where further information may be obtained.

SBA's "U.S. Government Purchasing and Sales Directory" provides an alphabetical listing of the products and services bought by the military departments and a separate listing for the civilian agencies. Also, the directory includes an explanation of the ways in which the SBA can help a business obtain Government prime contracts and subcontracts, data on Government sales of surplus property, and comprehensive descriptions of the scope of the increasingly important Government market for research and development.

The Department of Commerce provides the "Directory of Federal & State Business Assistance; a Guide for New and Growing Companies". This directory lists many of the key individuals who can assist in helping a firm sell products and services to the Government, and it lists those agency-wide procurement offices which have specific information about all of the procurement contacts in their agency.

Cambridge Information Group (a private concern) has available for sale "The National Directory of State Agencies". It is a guide that shows who controls what in every state and territorial government in the U.S. It lists names and phone numbers of state elected officials; state agencies arranged by function, such as Aeronautics, Real Estate, Purchasing; names, addresses, and phone numbers for associations of State Government officials; and an all-state telephone directory which lists alphabetically over 13,000 state officials, representatives, and staffers.

Sources for all publications mentioned above appear in Chapter 6.

All small and disadvantaged business owners are encouraged to visit the small business offices of agencies with interest in their products and services, to both seek assistance and review the large amount of written material which is available.

National Aeronautics and Space Administration

Small/Minority Business Personnel

NASA Headquarters*Washington, DC***Office of Small and Disadvantaged Business Utilization - Code K**

Director	Eugene D. Rosen	(202) 453 - 2088
Minority Business Advisor	Eugene D. Rosen	(202) 453 - 2088
Small Business Advisor	Franz W. Hoffman	(202) 453 - 2088

Contracts and Grants Division - Code HWB

Small Business Specialist	Mark Kilkenny	(202) 453 - 1840
Industry Assistance Officer	Lauria A. Carey	(202) 453 - 1857

NASA Space Station - Mail Code HR

Small Business Specialist 10701 Parkridge Boulevard Parkridge III Reston, VA 22091	Jane E. Martin	(703) 487 - 7143
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Field Installation Small Business/Minority Business Specialists

Ames Research Center Mail Stop 241-1 Moffett Field, CA 94035	Robert Medina	(415) 604 - 4690
Goddard Space Flight Center Mail Code 263 Greenbelt, MD 20771	Janet Jew	(301) 286 - 5029
Johnson Space Center Mail Code BD351 Houston, TX 77058	Robert L. Duppsstadt	(713) 483 - 4134
Kennedy Space Center Mail Code SI-PRO Kennedy Space Center, FL 32899	Ann Watson	(407) 867 - 7212
Langley Research Center Mail Stop 144A Hamptpn, VA 23665	Vernon Vann	(804) 864 - 2456
Lewis Research Center Mail Code 500-313 Cleveland, OH 44135	Steve Fedor	(216) 433 - 2144
Marshall Space Flight Center Mail Code APO16 Huntsville, AL 35812	Conrad Walker	(205) 544 - 0254
John C. Stennis Space Center Mail Code DAOO Stennis Space Center, MS 39529-6000	Rebecca Dubuisson	(601) 688 - 1636
NASA Resident Office, JPL Mail Code 180-805 Pasadena, CA 91109	DeVon Biggs	(818) 354 - 6050
Jet Propulsion Laboratory Mail Code 249-113 91109	Margo Kuhn	(818) 354 - 5722
Jet Propulsion Laboratory Mail Code 190-205 91109	Tina Lowenthal	(818) 354 - 7531

NASA Organization Chart

